

California Bioresources Alliance Symposium 2021



Pathways for Integrating Our Bioresources Management

"Making SB 1383 a cornerstone of growing local green communities"

NOV 18 & 19, 2021, 9:00 am – 5:00 pm, both days – *A Free Zoom Symposium*

Market integration in production, treatment, and distribution of bioresources

- **Moderator: Kevin Eslinger, California Air Resources Board**
 - **Speakers:**
 - Dan Noble, President, Noble Bioresources Inc.: **Bioresources Industry Systems Dynamics Model**
 - Christine Lenches-Hinkel, President, 301 Organics: Rose Bowl Community Compost and Education
 - Brian Vagg, President, Sprouting Soil: Soil Food Web – Biological Complete Compost
 - Kathlyn Draper, COB, International Biochar Initiative: European Biochar Standards

Noble Bioresources, Inc.

*Expanding bioprocessing and
bioproduct markets in our
local communities*

Dan Noble

President, NBI
Executive Director, ACP

Bioresources Industry Systems Dynamics Model

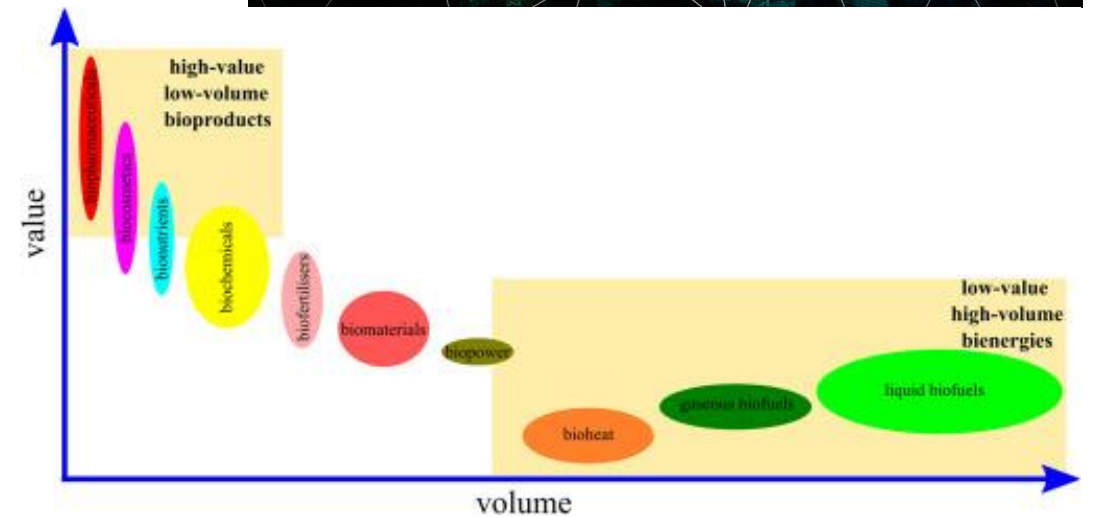
Topics –

- Bioresources → Bioprocessing → Bioproducts
- Bioresource economic model & elements
 - Feedstocks
 - Technologies
 - Products
- Data Elements - Integrated Market Analysis-using the model
 - Sub=elements – capital and carbon
 - Fitting into the meso-economics of the local economy
- Decision models that support your enterprise investments
- Integrating & Using the Bioresource Decision models

Noble Bioresources, Inc. – NobleBioresourcesInc.com

Our Integrated Business Model

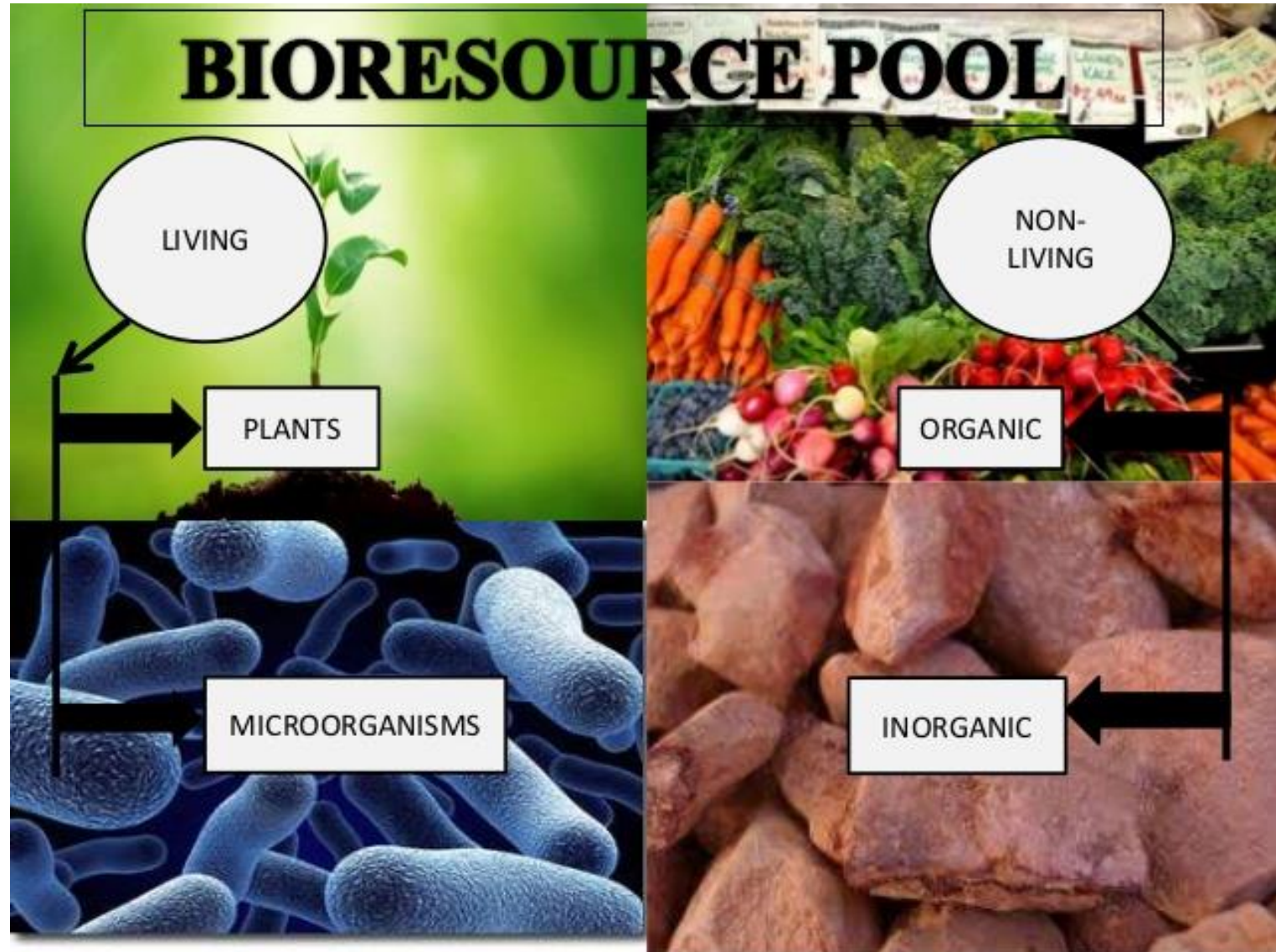
- **Consulting** – strategic marketing, technical/scientific, operational, functional sales
- **Data** – research, databases, system dynamics modeling, dashboards
- **Direct Solutions** –
 - Feedstock contracting
 - Facility Siting & Acquisition
 - Product Sales
 - Franchise Model



What are bioresources?

Primary (6 F's)

- Food
- Fiber
- Feed
- Fuel
- Flowers
- Fertilizers
(organic)



What are bioresources?

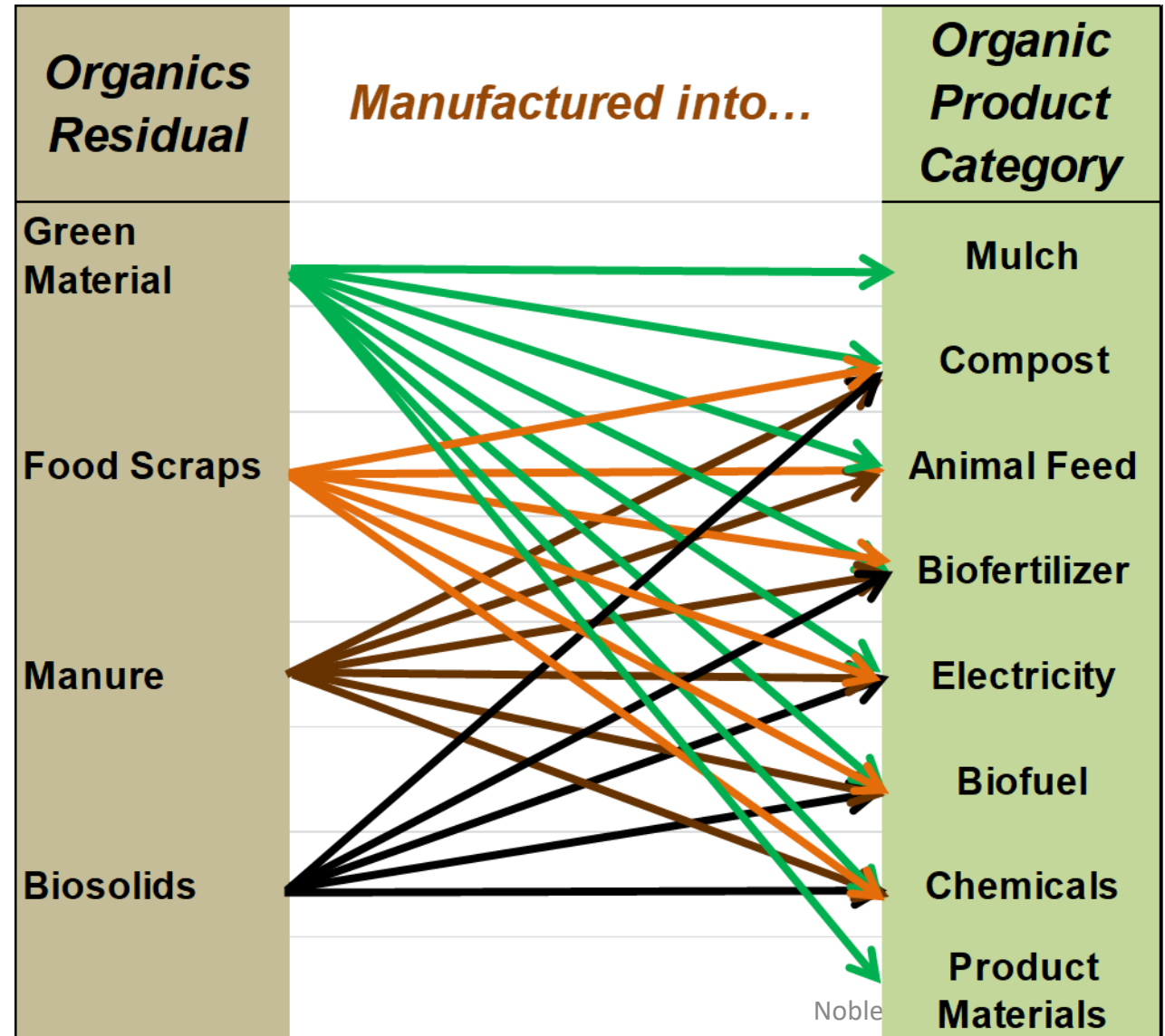
Secondary –

- Green Material
 - Leafy
 - Woody
- Food Scraps
- Manure
- Biosolids



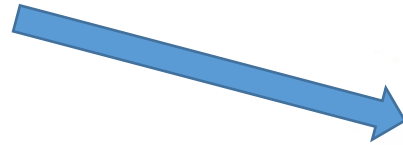
Bioresources → Bioprocessing → Bioproducts

- **Primary** – food, fiber, feed, fuel
- **Secondary** –
Feedstocks for bioprocessing:
 - Green Material
 - Leafy
 - Woody
 - Food Scraps
 - Manure
 - Biosolids



What is Bioprocessing?

- Mulch Production
- Composting
- Biofertilizer manufacturing
- Biochar manufacturing
- Feed manufacturing
- Material manufacturing
- Chemical manufacturing
- Energy production - AD
 - Electrical
 - Fuels
 - Combined heat and power



Bioproduct Categories – *potential product portfolio*

- **Mulch**



- **Compost**



- **Biofertilizer**



- **Biochar**



- **Animal Feed**



- **Electricity**



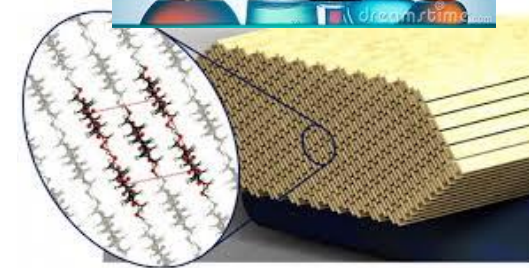
- **Biofuels**



- **Chemicals**



- **Product Materials**

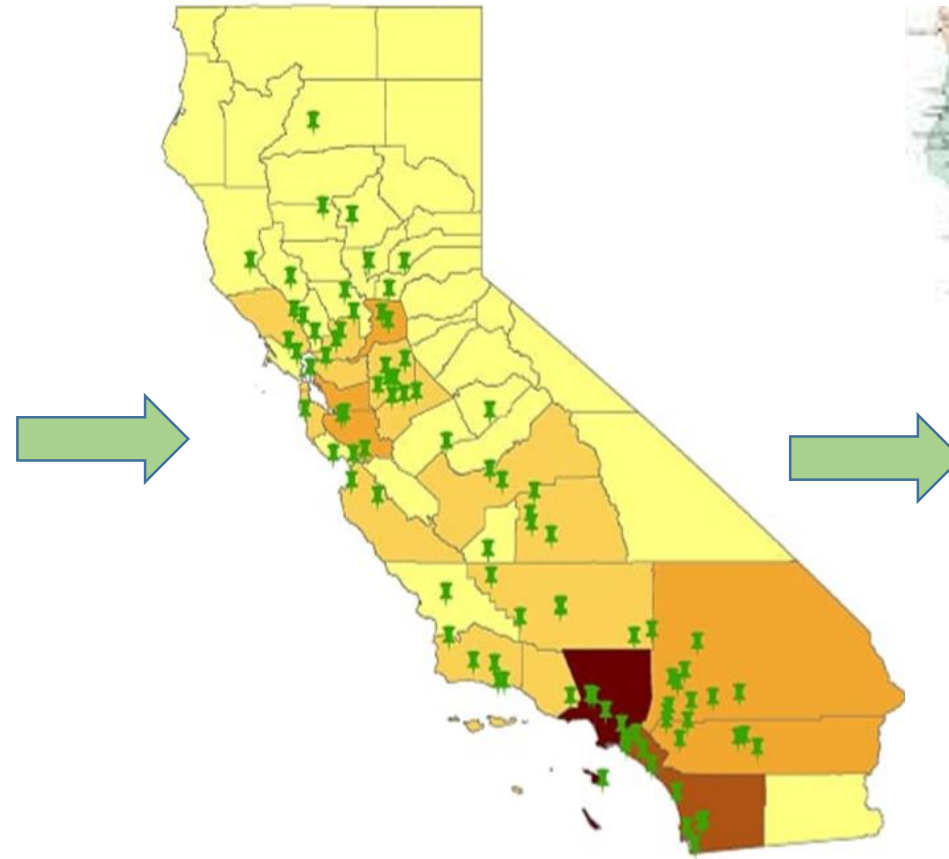


Bioresources → Bioproducts: State Level *Market Distribution & Market Value*

Bioresource Feedstocks



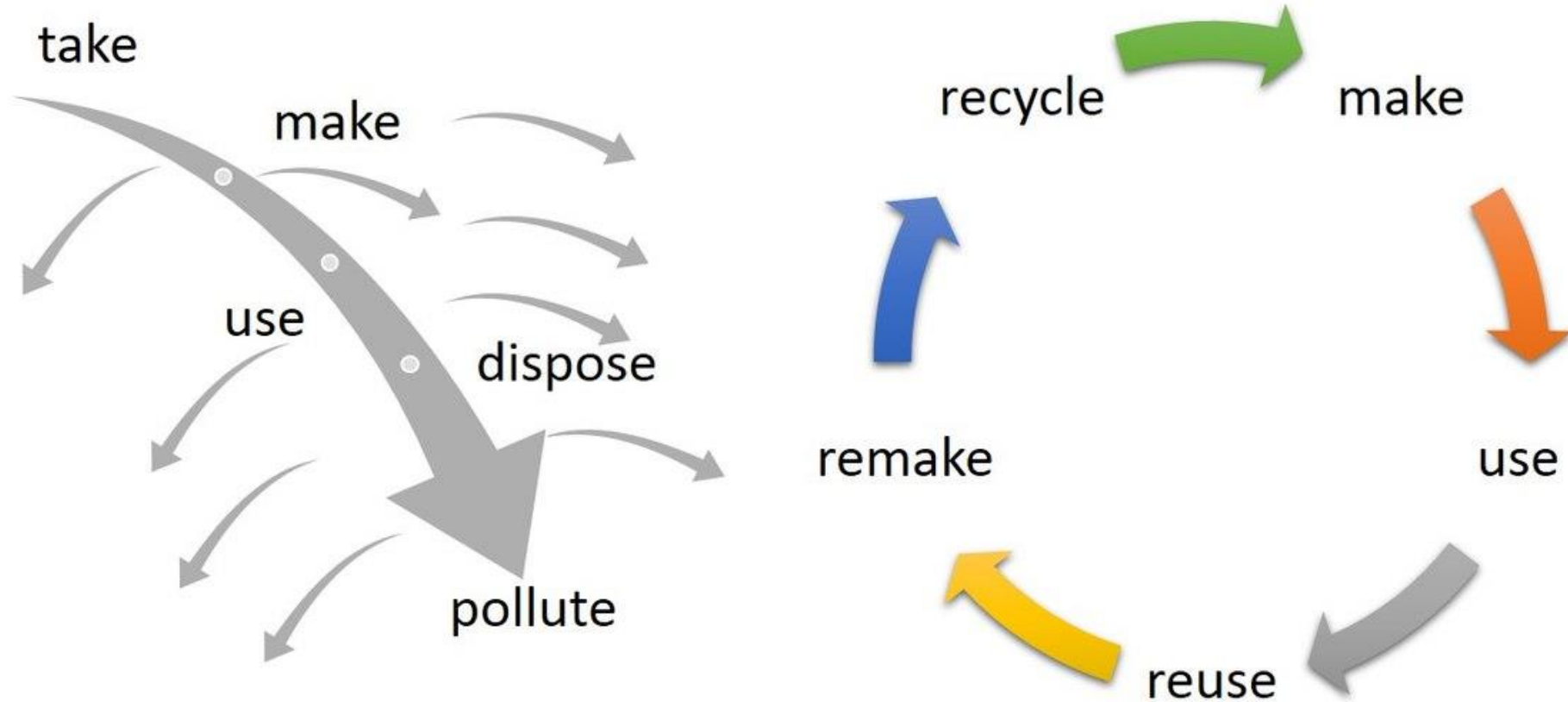
Bioprocessing Facilities



Bioproduct Markets

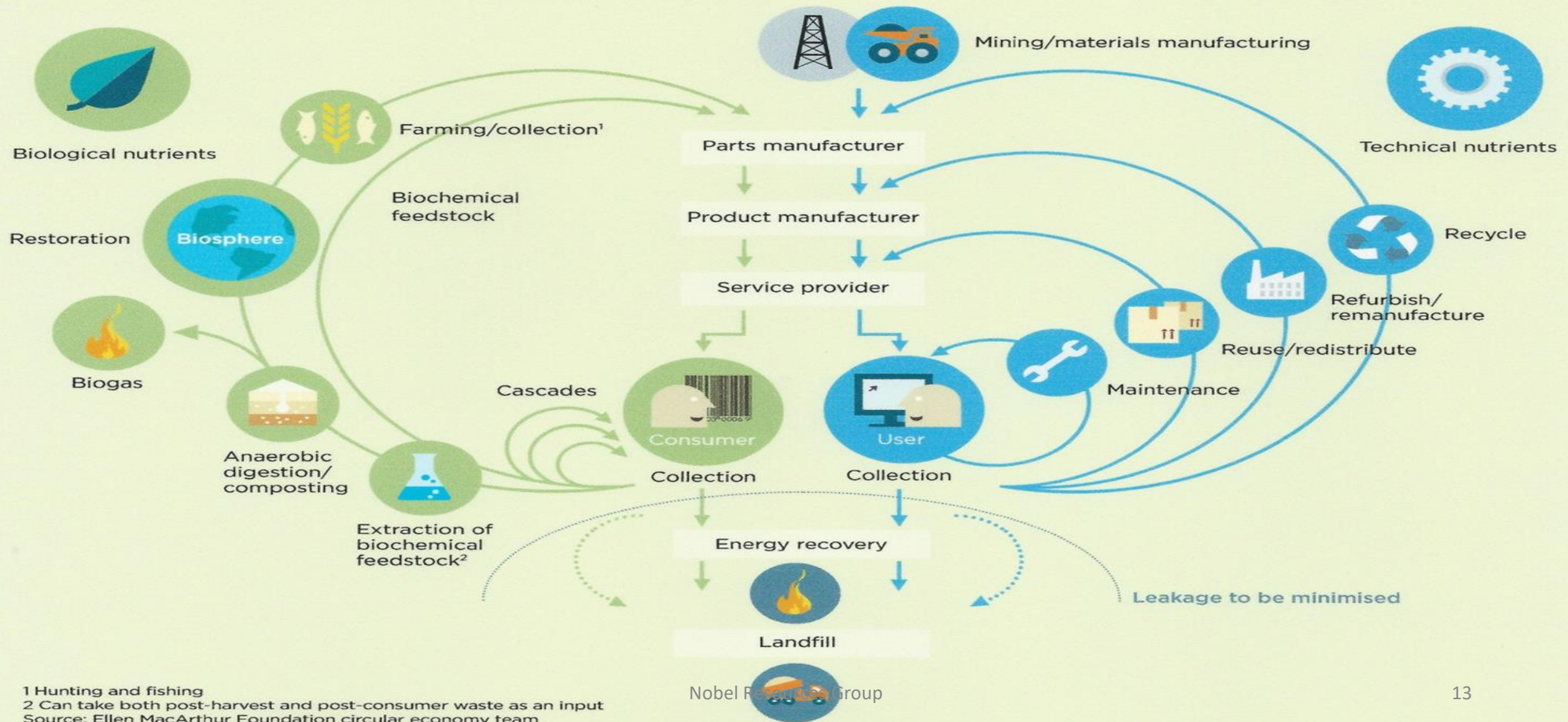


Disposal → Regenerative Economic Model



CC 3.0 Catherine Weetman 2016

Emerging Circular, “Butterfly,” Economy: *an industrial system that is regenerative by design*



US Bioeconomy Model*

The U.S. bioeconomy is economic activity that is driven by research and innovation in the life sciences and biotechnology, and that is enabled by technological advances in engineering and in computing and information sciences.

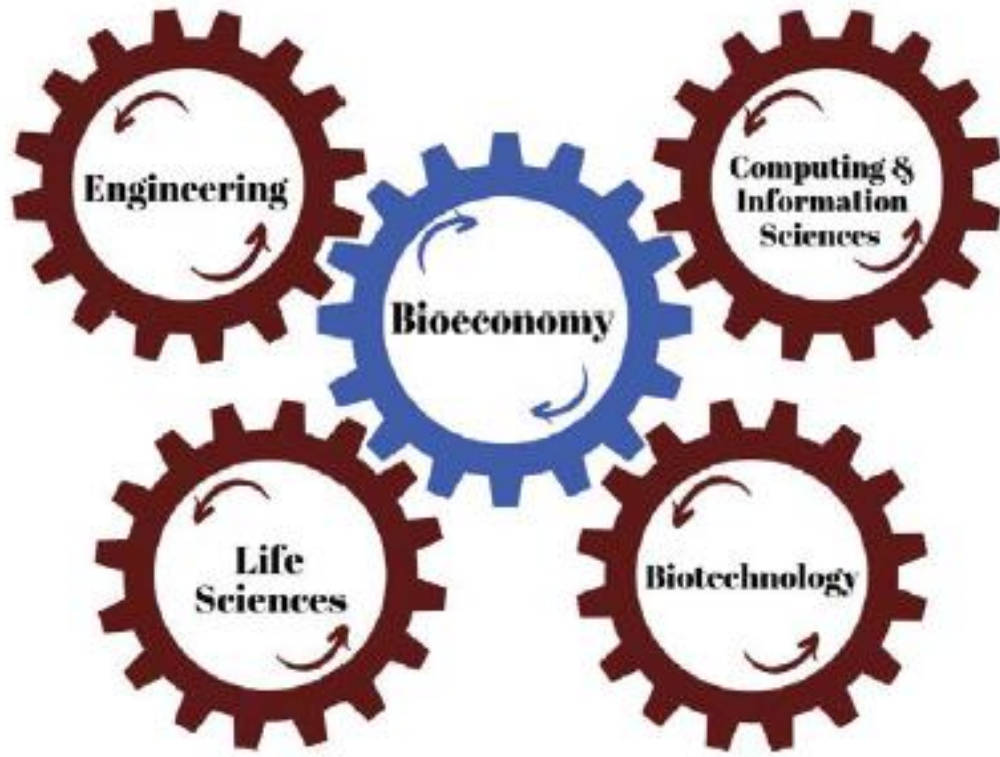


FIGURE 1-1 Four drivers of the U.S. bioeconomy.

*From "Safeguarding the Bioeconomy - NASEM - 2020" – National Academy of Sciences

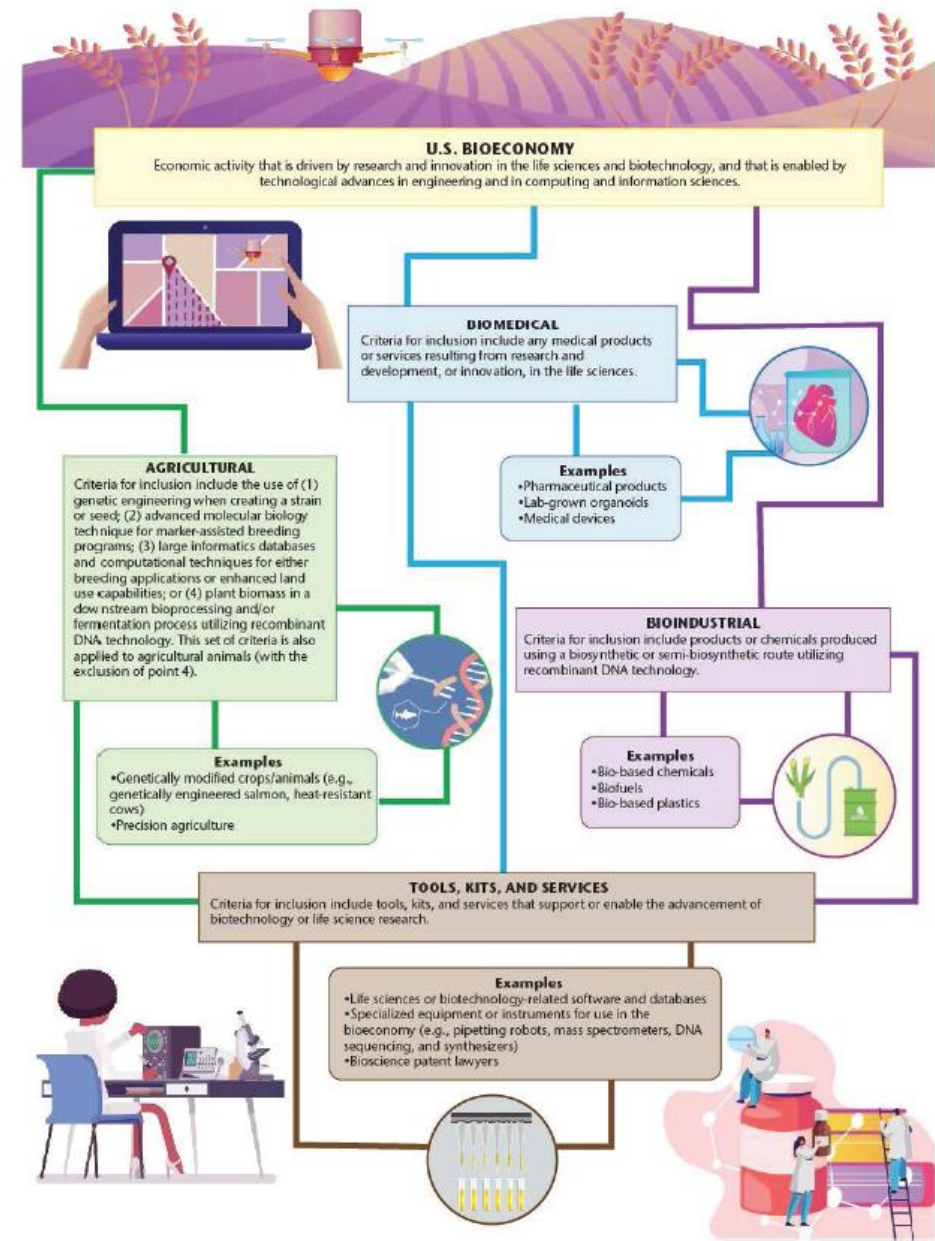
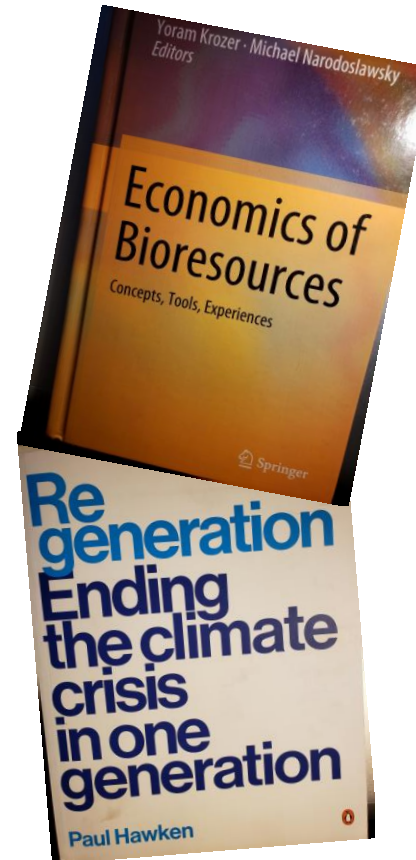
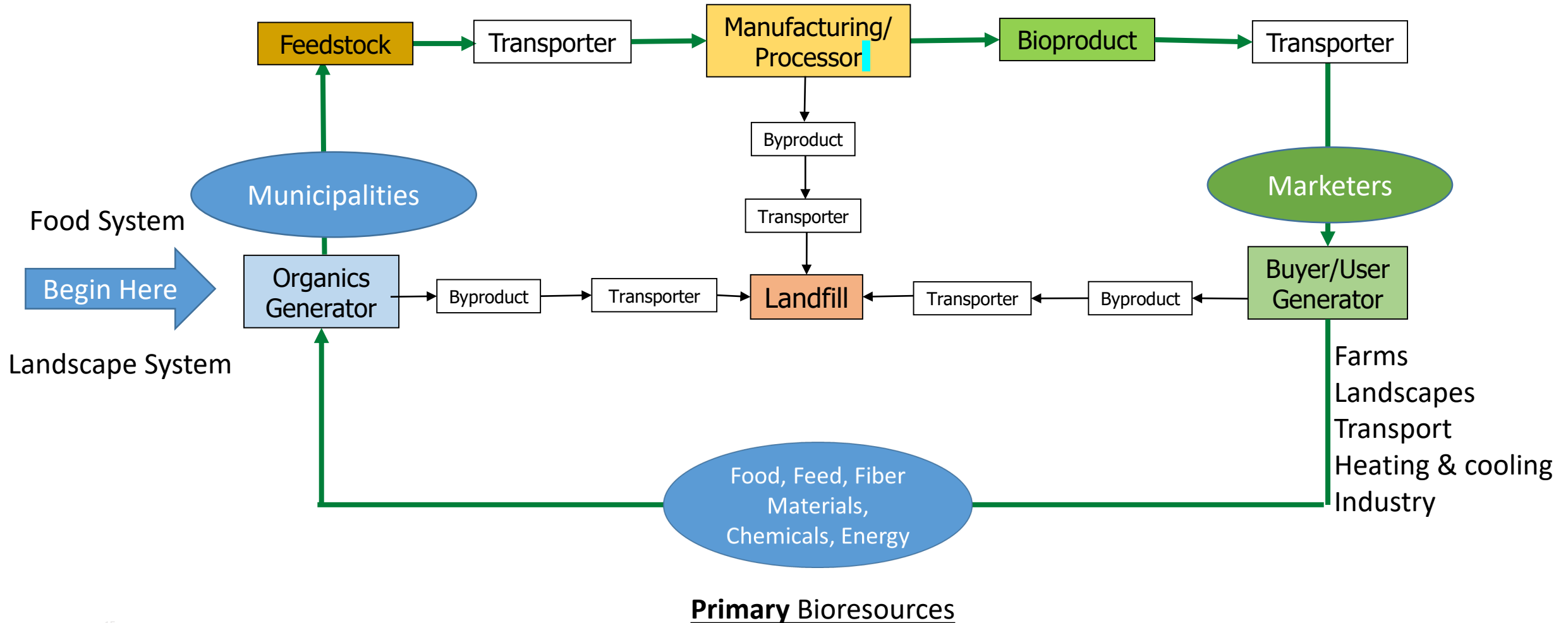


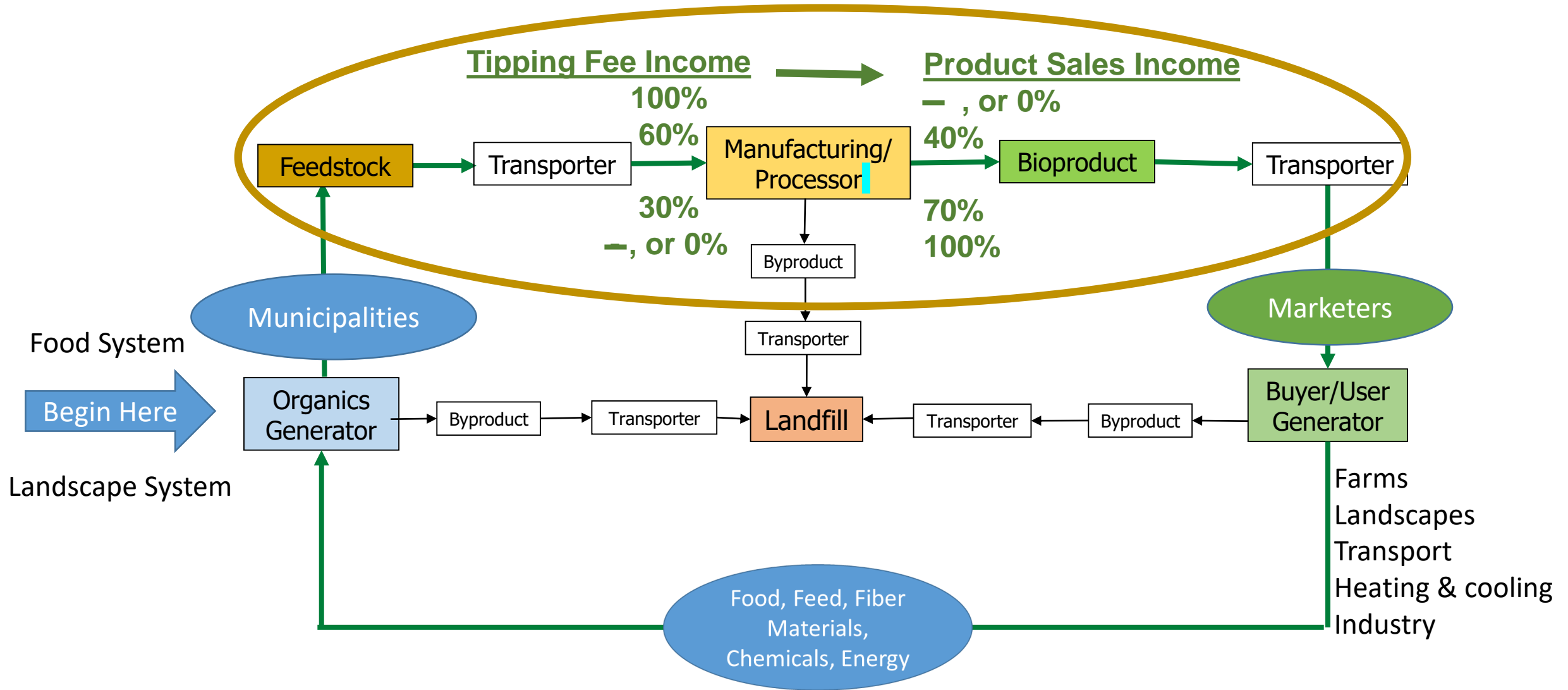
FIGURE S-1 Examples and explanations of highlighted sectors of the bioeconomy landscape that fall under the definition put forth in this report. The committee grouped the activities within the bioeconomy into three primary domains: agricultural, biomedical, and bioindustrial. Additionally, the committee identified a cross-cutting category of tools, kits, and services.

Community Bioeconomy – *a local circular bioeconomic model*

Secondary Bioresources, or Organic Residuals, Organic Waste, Feedstock,

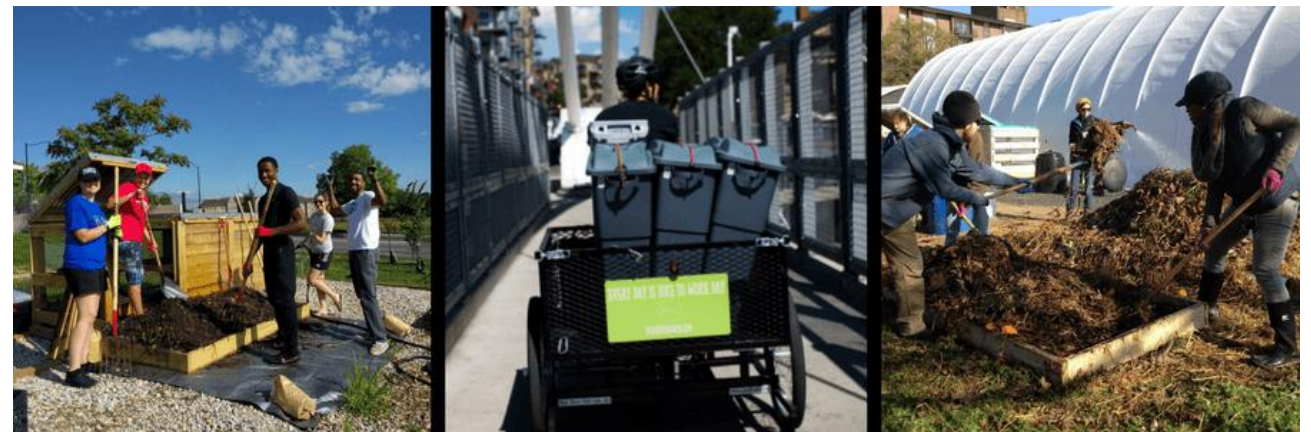


Composter Enterprises – *in the local value cycle*



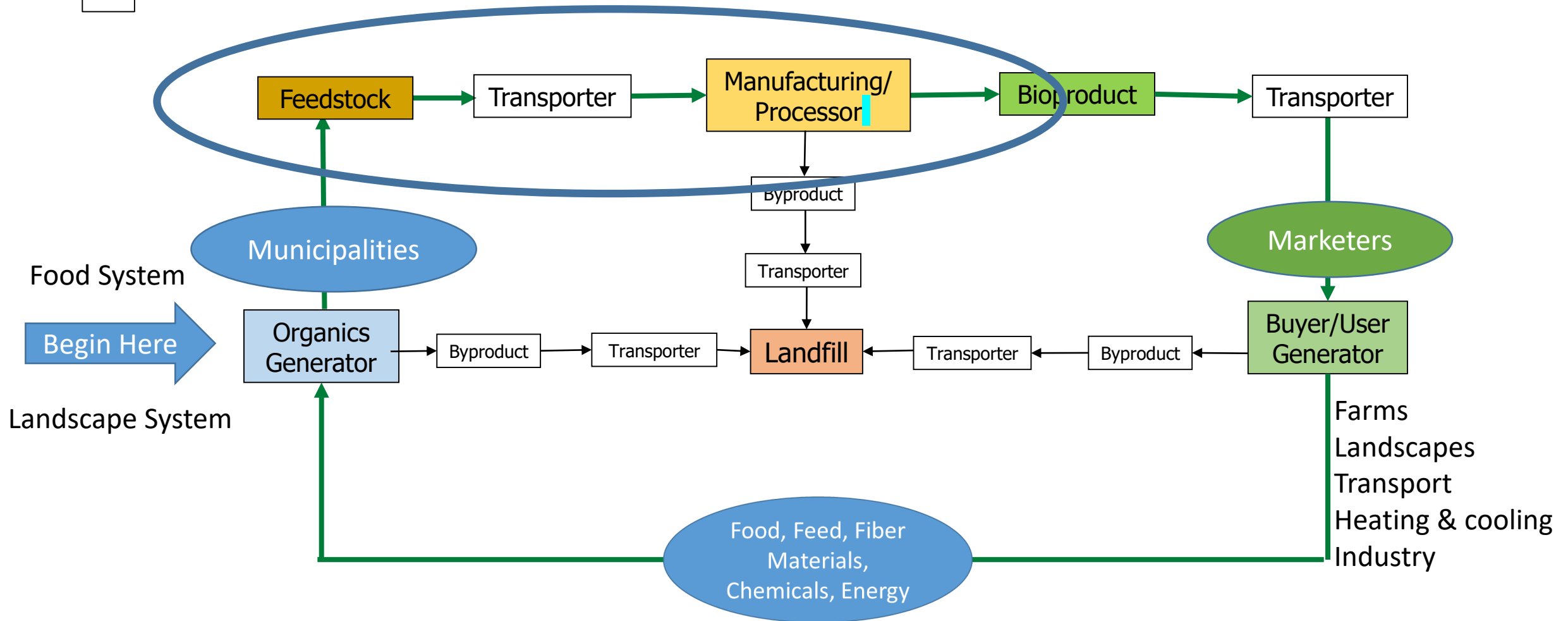
6 Generic Compost Enterprise Models

1. **Municipal** Green Waste & Food Scrap Composter
2. **Wastewater Agency** Biosolids Composter
3. **Community** Composter
4. **Franchise Hauler** Composter
5. **Independent** Composter
6. **Agricultural** Composter



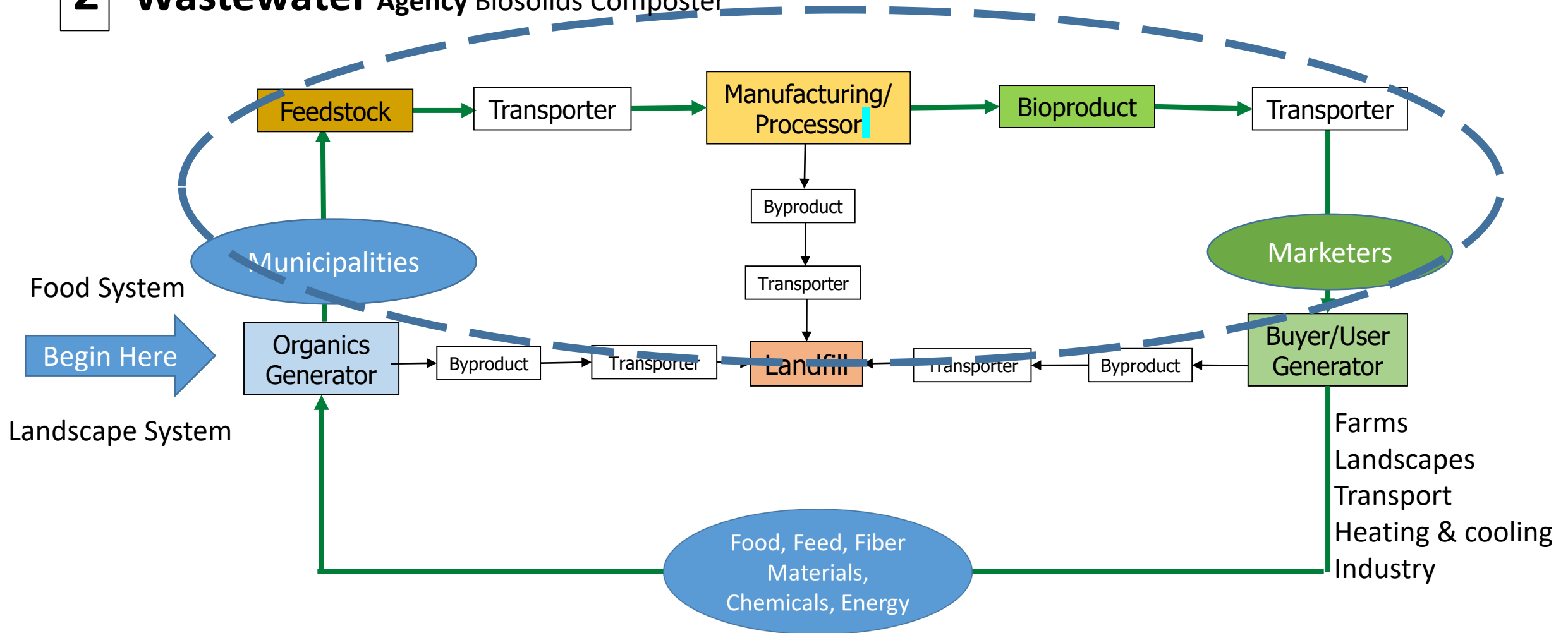
6 Generic Compost Enterprise Models

1 Municipal Green Waste & Food Scrap Composter

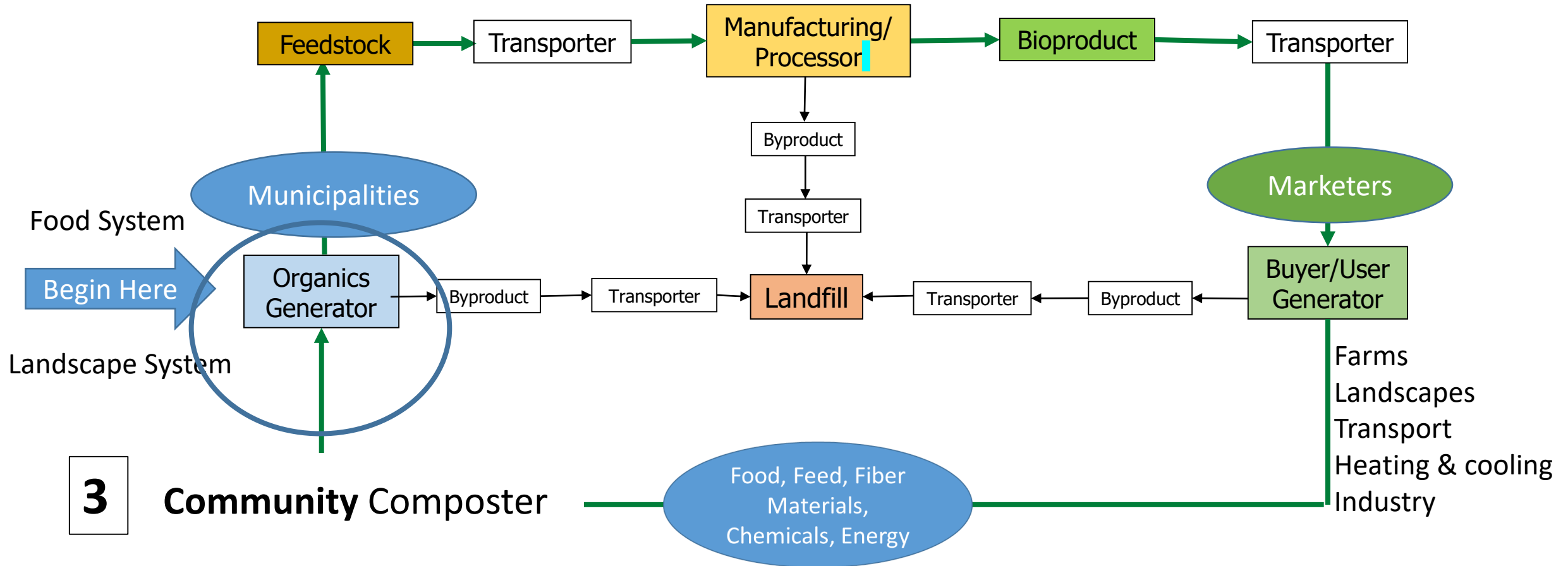


6 Generic Compost Enterprise Models

2 Wastewater Agency Biosolids Composter

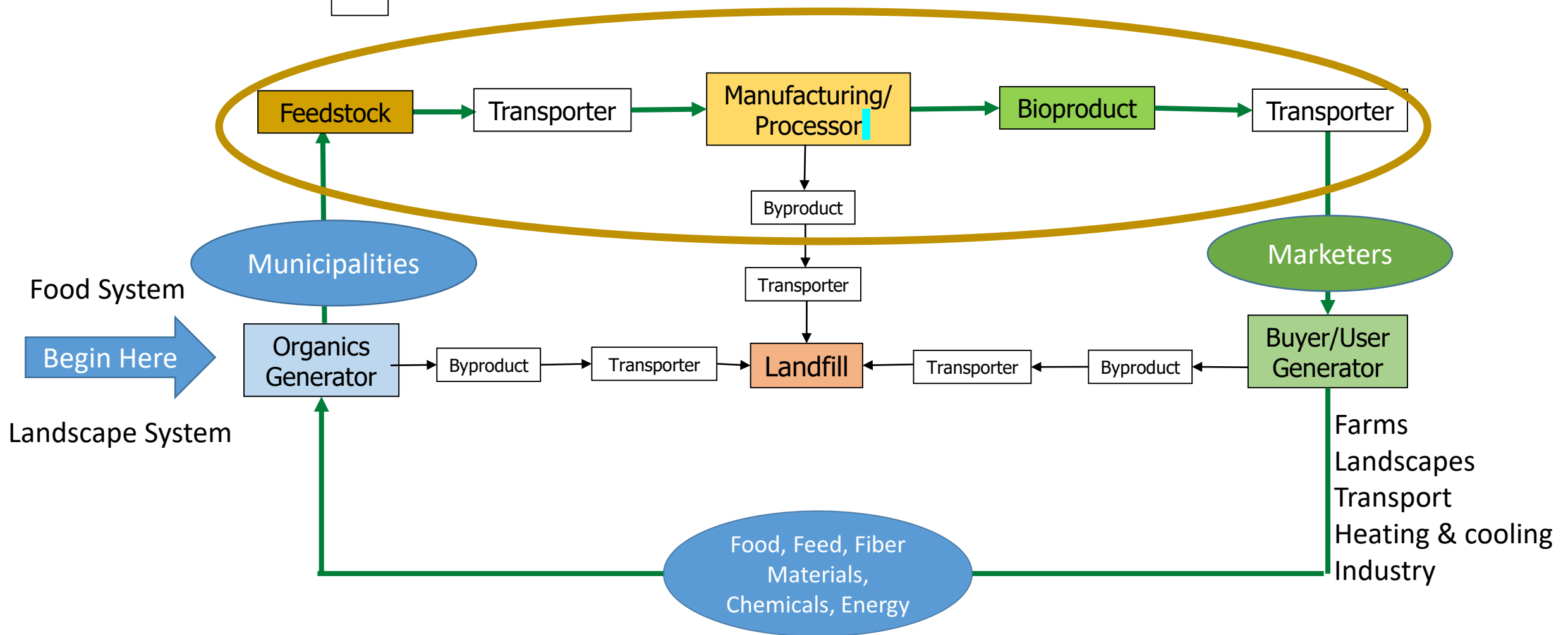


6 Generic Compost Enterprise Models



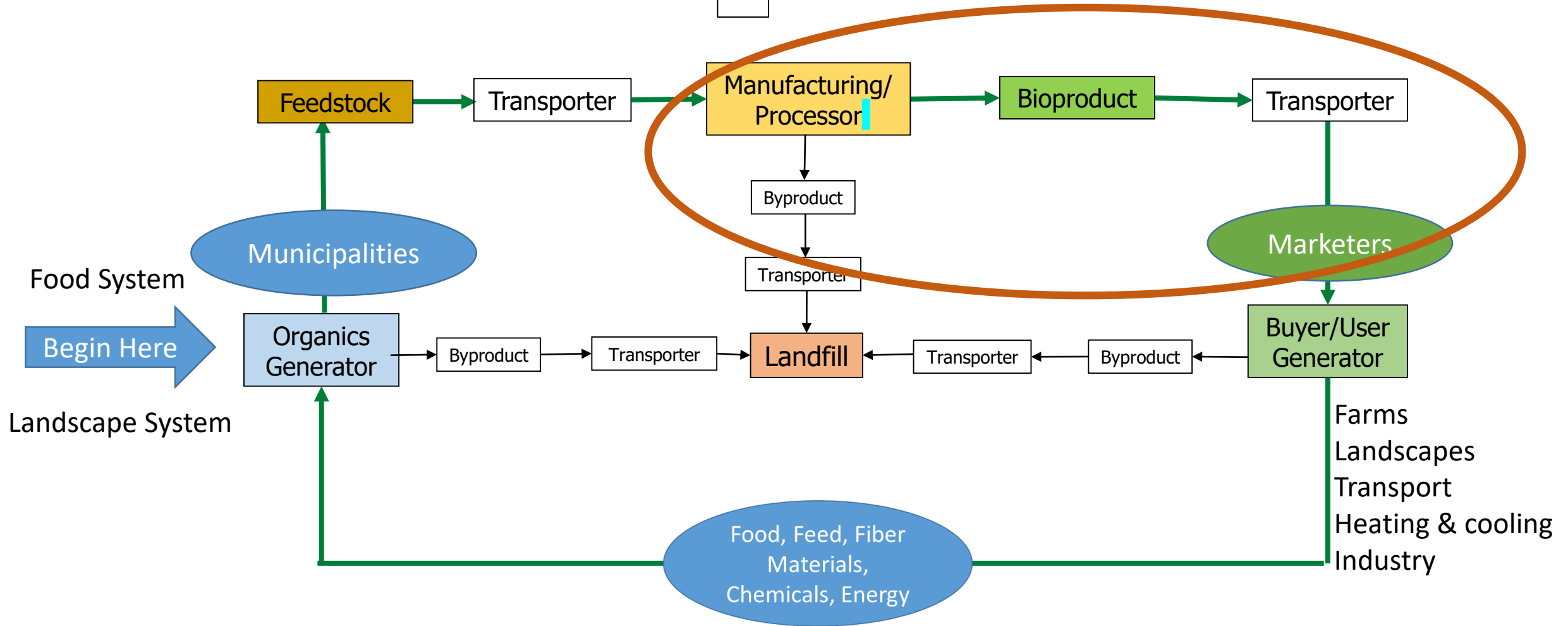
6 Generic Compost Enterprise Models

4 Franchise Hauler Composter

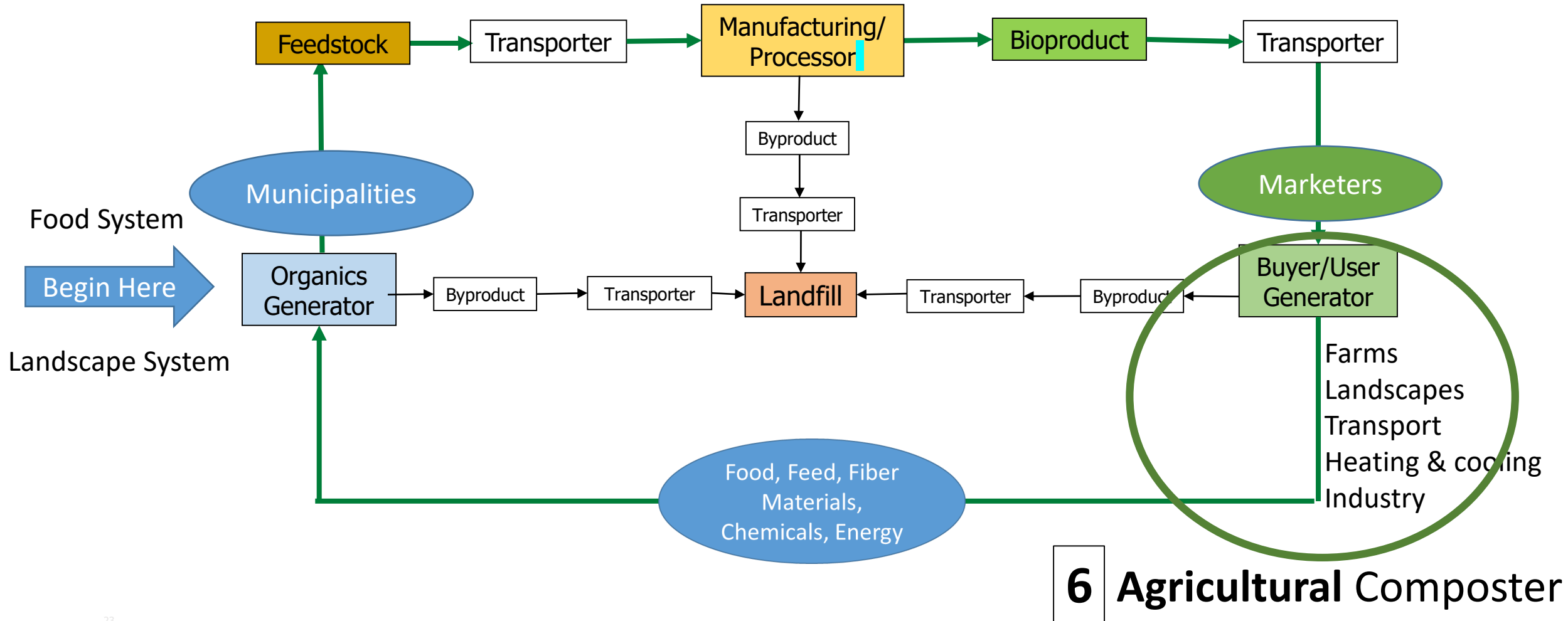


6 Generic Compost Enterprise Models

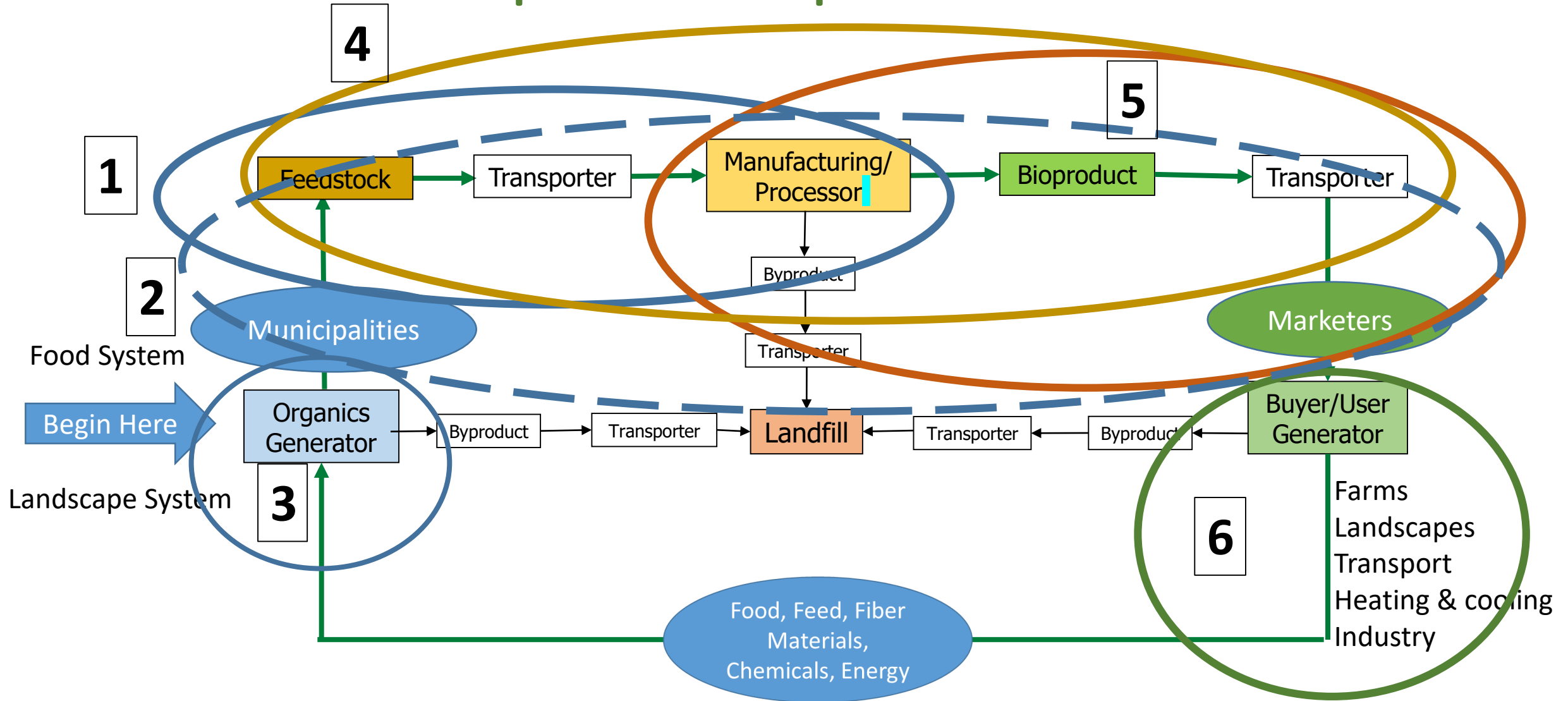
5 Independent Composter



6 Generic Compost Enterprise Models



6 Generic Compost Enterprise Models



Data Categories – *Integrated Market Analysis- using the model*

Secondary Bioresource Markets

- Feedstock
- Bioprocessing technology
- Bioproduct

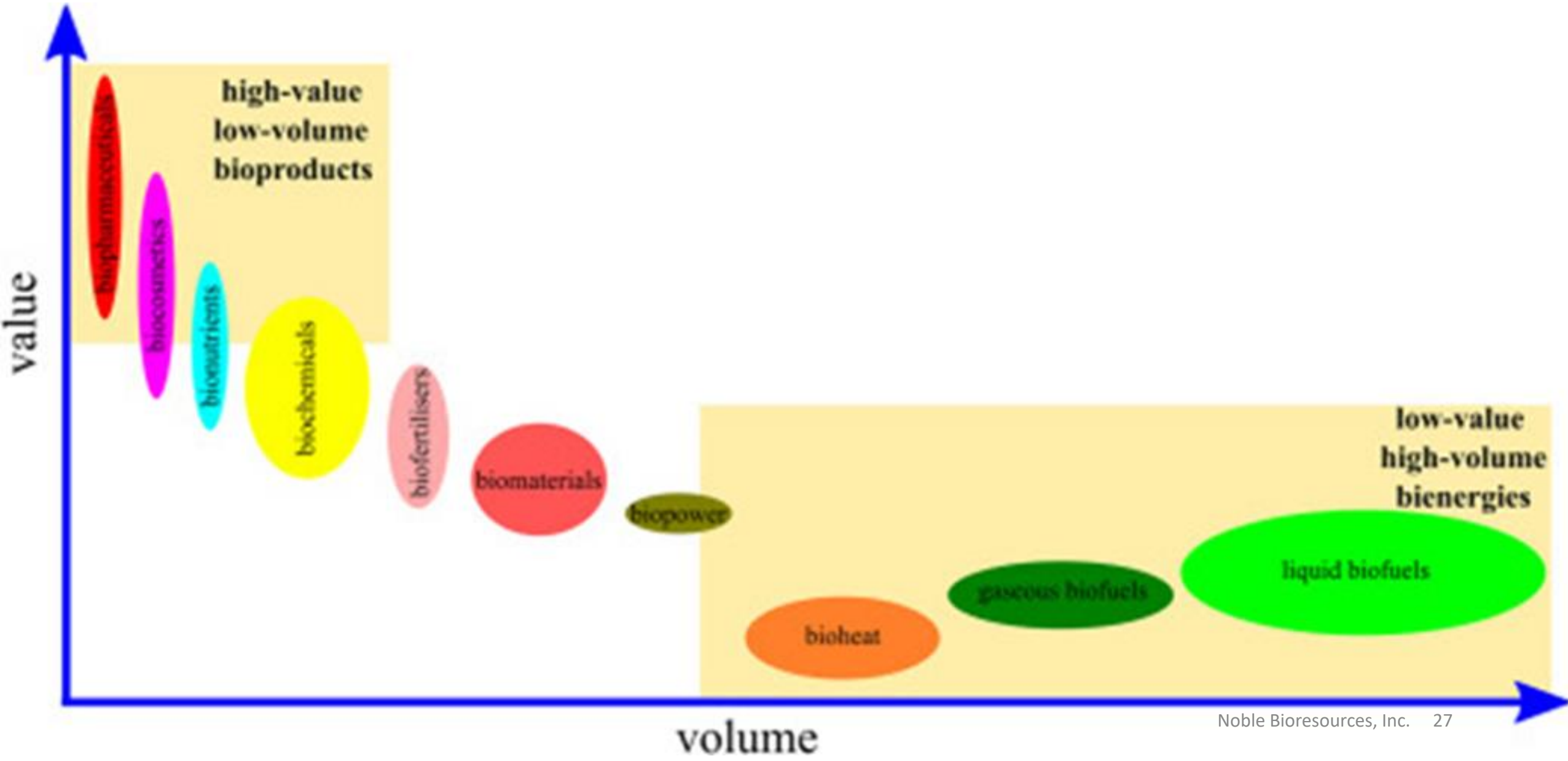
Tertiary Markets

- Air – emissions offsets
- Water – wholesale & retail
- Energy – fuel, electricity
- Carbon – credits, cap & trade
- Capital – debt & equity
- Soil – natural, engineered

Objective of Bioprocessors:

**Connect local feedstock markets with local bioproduct markets ...
within the context of the local tertiary markets.**

Bioproducts Portfolio – Value /Volume Curve



Compost Quantity

(Efficiency/In → Delivered/Out)



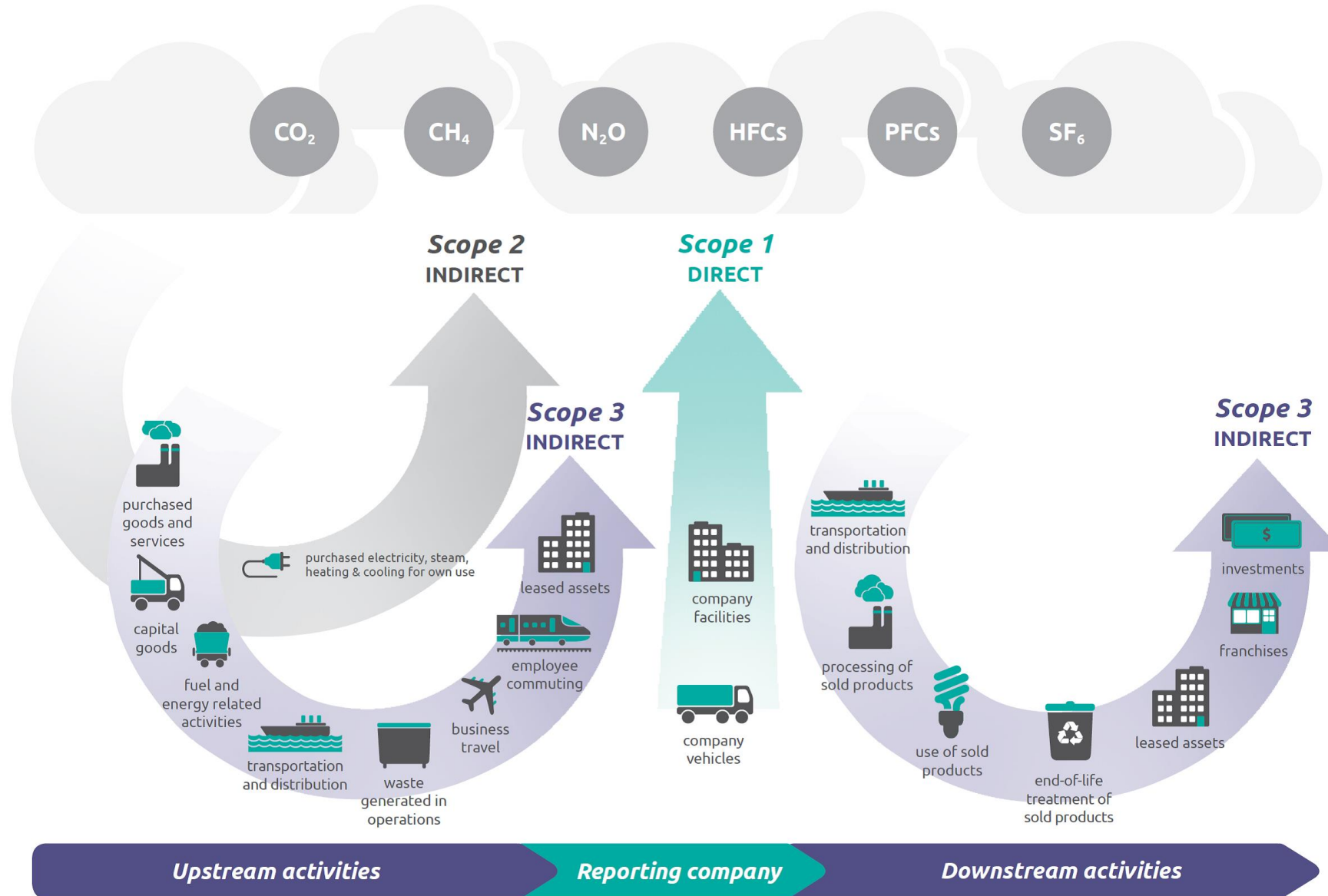
Untested, low quality Trashy/Contaminated Compost

Bioresource Options that you Own &/or Operate

Your Bioresource Enterprise Model Options					Last Update: 7/27/2020			
		Sites/Locus of Analysis						
Option/Case	Possible Options	Generator Site		Processor Site		Buyer/User Site		Type of Model
		Onsite	Offsite	Onsite	Offsite	Onsite	Offsite	
Generator Disposal	Current - green, food, biosolids	X			X		X	Disposal Service
Processor Offsite, Purchase onsite	Woody Resource	X			X	X		User
Processor	Buying compost or other bioproducts		X		X	X		Buyer
All on Generator's Site	All Onsite (Dining Commons Digester)	X		X		X		DIY
Generator & Processor onsite, Purchase offsite	Produce Bioproducts	X		X			X	Producer
Processor Owner Perspective	Be in the processor business		X	X			X	Processor
Use/Processor	Processor/User		X	X		X		Procissor/ User
Not your facility	If you are interested in the local industry/markets		X		X		X	Bioresource Industry

EPA Center for Corporate Climate Leadership

Scope 1 and Scope 2 Inventory Guidance



<https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance>

Your Enterprise Model

- **Public** – Government, especially Cities and Counties
– Your local resource and utility managers
- **Private companies** – From old extractive, to emerging regenerative
- **Social Enterprises** – B Corps, Mission driven, ESG (Env., Social, Govern.)
- **Non-profits** – Social AND environmental
- **Education & Research** – K thru 12, College, Universities



Porter's Enterprise Value Chain Model



https://en.wikipedia.org/wiki/Value_chain

Investment domains



• Feedstock Portfolio

– *carbon, energy, water, building spectrum*

- Quantity dynamics - bulk density of the various qualities
- Quality dynamics – analysis and segregation of types

• Technology Portfolio

- Worm castings
- Compost
- Anaerobic Digestion
- Combined Heat & Power
- Pyrolytic Conversion
- Biorefinery
- Others?

• Bioproduct Market Portfolio

Soil Amendments, Ag Inputs

- Compost, woody mulch, worm castings
- Biofertilizer, Biologics, Biochar

Materials & Chemicals

- Biochemicals, bioplastics, etc.

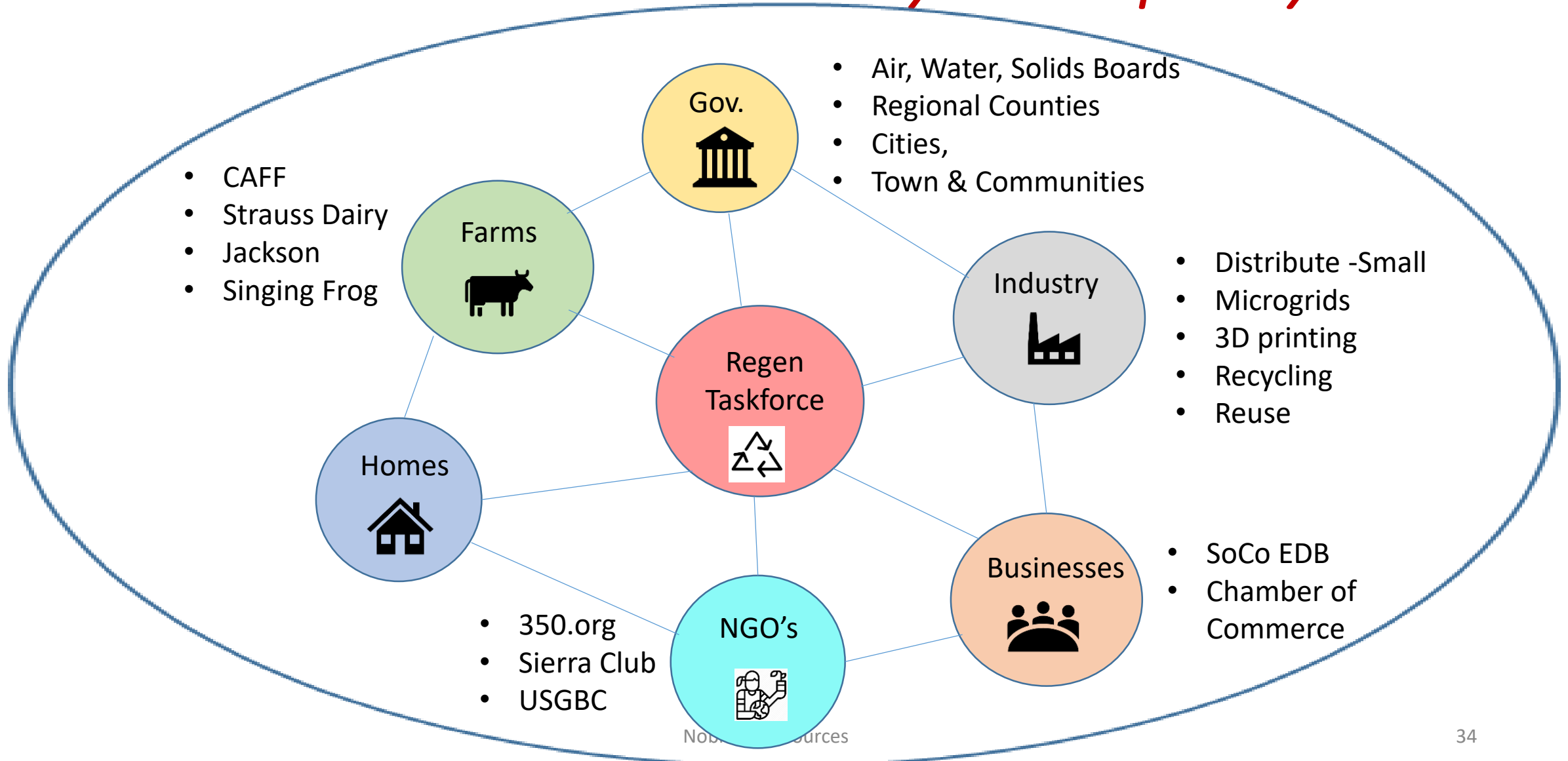
Energy

- Fuel, biogas
- Electricity
- Combined heat & power

Animal feed

Regenerative Economic Development

- Local Stakeholder Diversity & Complexity -



Your Brand & Fit into your local bioeconomy

- **Type of Incorporation**

- Municipal/Government
- Private
- Non-profit
- Educational Institution
- Public Private Partnership

- **Type of Enterprise & Facilities**

- Agricultural
- Food/fiber processing
- Bioprocessor
- Generator
- Collections
- Landscapes

- **Type of Community**

- Biome type – rain, temp, climax species
- Population density – urban or rural
- Water & Energy – flows and stocks
- Ag/urban ratio

- **Types of Markets**

- Ag
- Landscape
- Watershed Mgmt.
- Natural & Working Lands
- Bioenergy



Bioresources Industry Systems Dynamics Model

Dan Noble, President

Noble Bioresources, Inc.
Bioproducts Market Development

Cell/text: (619) 992-8389

DanWylderNoble@gmail.com

NobleBioresourcesInc.com

Market integration in production, treatment, and distribution of bioresources

- **Moderator: Kevin Eslinger, California Air Resources Board**
 - **Speakers:**
 - Dan Noble, President, Noble Bioresources Inc.: **Bioresources Industry Systems Dynamics Model**
 - Christine Lenches-Hinkel, President, 301 Organics: Rose Bowl Community Compost and Education
 - Brian Vagg, President, Sprouting Soil: Soil Food Web – Biological Complete Compost
 - Kathlyn Draper, COB, International Biochar Initiative: European Biochar Standards