California Bioresources Alliance
11th Annual Symposium
"Renewable Carbon Management in California"

Compost - Healthy Soil Market Development

November 2, 2016 ***3:00pm – 4:30pm***

BIOPRODUCTS INDUSTRY DEVELOPMENT STRATEGY

A Framework for Market Analysis

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ASSOCIATION OF COMPOST PRODUCERS

"We Build Healthy Soil"

www.healthysoil.org

Topic Outline

- **Association of Compost Producers**
- **Bioproducts**
- **Organics Residuals → Bioproduct Markets**
- **Integrated Market Analysis, Plan & Infrastructure Development**

Association of Compost Producers

A Public/Private Association - 501(C)6 – Calif. State Chapter of US Composting Council

- Public and Private Organics Residual Generators
  - Green Waste, Manure *(into and out of animals)*
  - Food Waste, Biosolids *(into and out of people)*
- Public and Private Compost Producers
- Public and Private Compost Marketer/Distributors

Our Vision:

- ***Support beneficial reuse of organics in California, compost playing a central role to***
- ***Build and maintain sustainable healthy soils,***
- ***Keeping our state's lands productive, green and biologically diverse for generations to come.***

Our Mission:

Increase the quality, value and amount of compost being used in California.

- **Burrtec**
- **CalPoly SLO**
- **CR&R**
- **Engel and Gray**
- **Filtrexx**
- **Inland Empire Utilities Agency**
- **Kellogg Garden Products**
- **Liberty Compost**
- **Los Angeles County Sanitation Districts**
- **P.F. Ryan and Associates**
- **Serrano Creek Soil Amendments**
- **Scott Brothers Dairy**
- **Synagro**
- **University of California, Cooperative Extension**
- **Vision Recycling**

COMPOST PRODUCERS

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Bioproducts: Development of a Circular Economy

Linear Economy*

"Value Chains"

Natural Resources & Resource Industries

- •Air
- •Water
- •Land & Minerals
- •Energy
- •Biological

→

Industrial Processes, Distribution & Product Use

→

Waste & Pollution

*** From Eugene Odum, Ecology, 1963 and www.Ecocycle.org, 2008**

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Journey to Sustainability: Development of a Circular Economy

aka Zero Waste, Regenerative Economy*

"Value Cycles"

Natural Resources & Resource Industries

- Air
- Water
- Land & Minerals
- Energy
- Biological

Industrial Processes, Distribution & Product Use

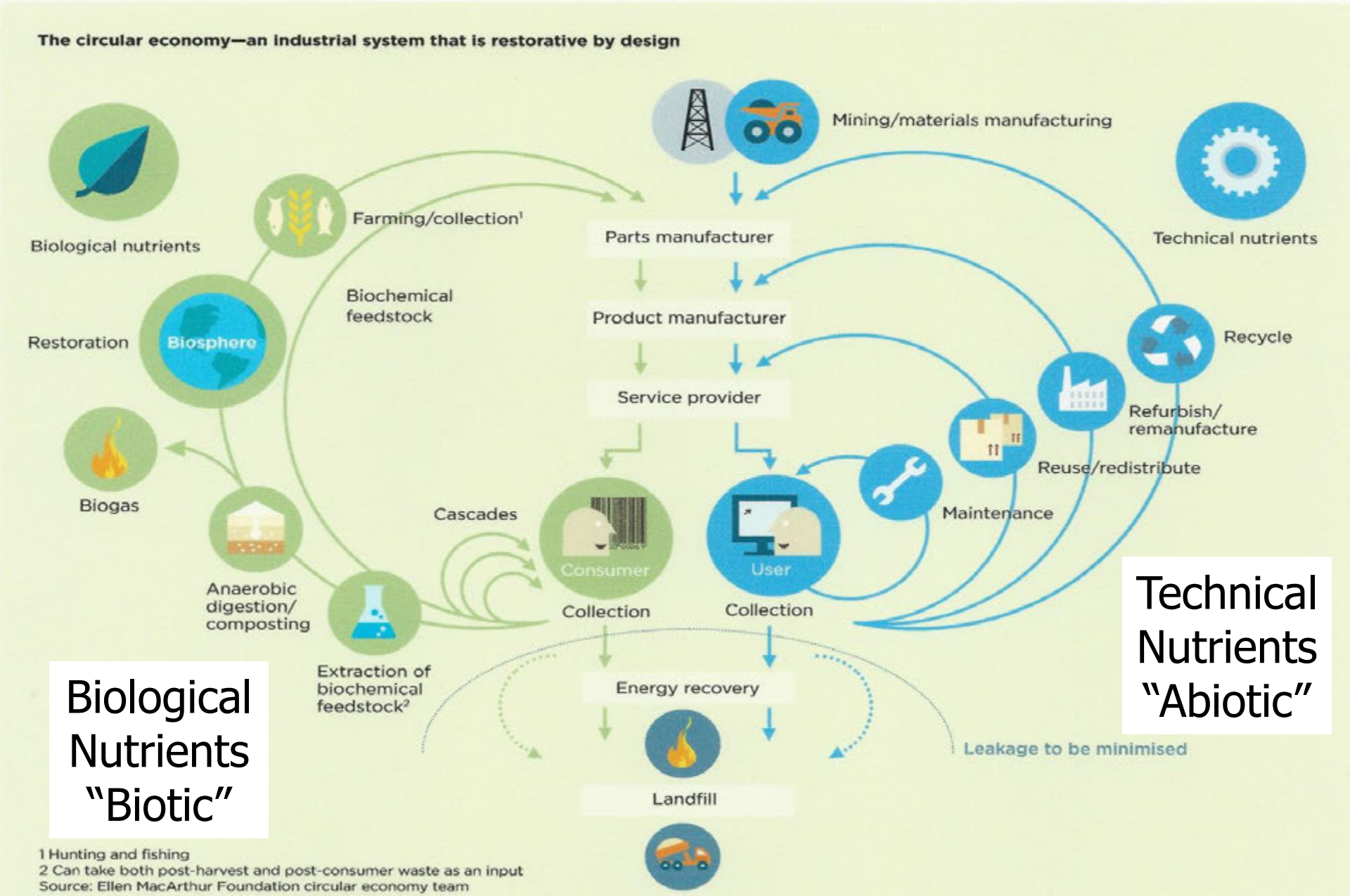
Waste & Pollution

Environmental Industry

- Sanitation/Collection
- Env. Protection
- Recycling
- Remanufacturing

From Eugene Odum, Ecology, 1963 and www.Ecocycle.org, 2008

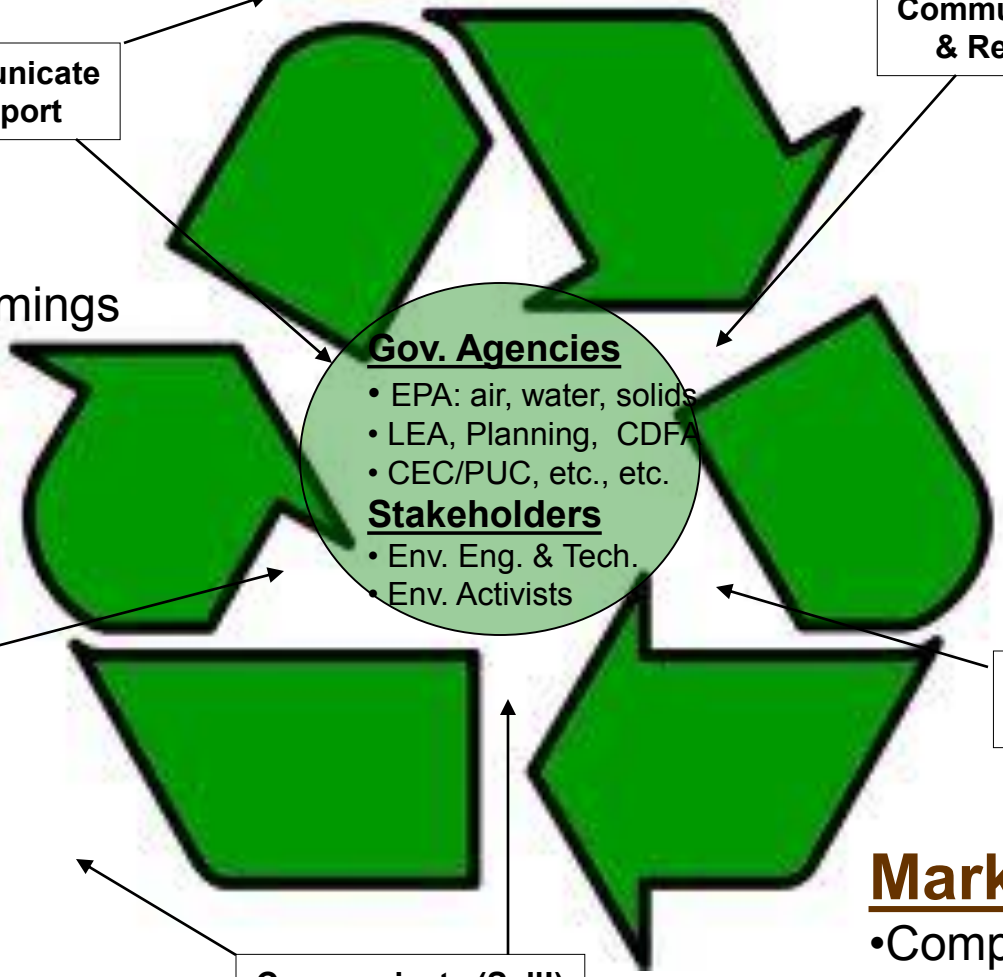
Emerging Circular Economy:



Biological Nutrients "Biotic"

Technical Nutrients "Abiotic"

The Organics Value Cycle



Haul, Pre-process:

Communicate & Report

Communicate & Report

Generate:

- Landscape trimmings
- Food/Ag waste
- Biosolids
- Manure

Gov. Agencies
- EPA: air, water, solids
- LEA, Planning, CDFA
- CEC/PUC, etc., etc.

Stakeholders
- Env. Eng. & Tech.
- Env. Activists

Process:

- Compost
- Chip and Grind
- Anaerobic Digestion
- Biofertilizer
- Energy (biofuel, electricity)

Communicate & Report

Communicate & Report

Use:

- Landscape
- Agriculture
- Environmental
- Bioenergy

Communicate (Sell!) & Report

Market:

- Compost
- Fertilizer
- Energy

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Biological Nutrients

Carbon's "6 F's"

Food

Fuel

Fiber

Foliage

Feed

Fertilizer

Organic Residuals are…

From Agricultural Product to Organics Residual

Food → *Disposer & Sewage* → ***Biosolids***

Fiber → *Solid Waste* → ***Food scraps***

Foliage → *Landscape Maintenance* → ***Green material*** / ***Woody material***

Feed → *Livestock Waste* → ***Manure***

Fuel

Fertilizer

→ ***No Residual (except pollution!)***

Feedstocks to Bioproducts

Feedstock(s) (organic residuals) →

Process train →

Bioproduct(s)

Feedstocks to Process Train

Organic Feedstocks

- *Green material*
- *Woody Material*
- *Food scraps*
- *Biosolids*
- *Manure*

Processing

- *Chip & Grind*
- *Composting*
- *Feed Production*
- *Anaerobic Digestion*
- *Thermo-chemical*
- *Microbial Fermentation*

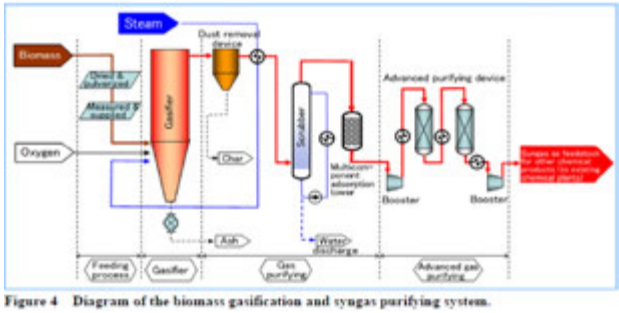


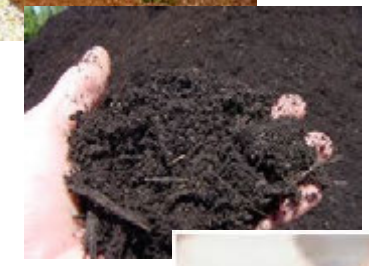
Figure 4 Diagram of the biomass gasification and syngas purifying system.

Bioproduct Portfolio, or Categories

aka Categories of Value

- Mulch

- Compost



- Biofertilizer

- Biochar

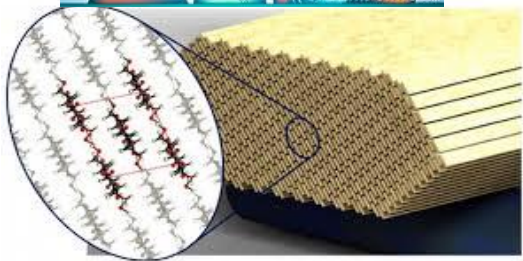
- Animal Feed

- Electricity

- Biofuels

- Chemicals

- Product Materials



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Feedstocks to Bioproducts

5 interrelated and integrated MARKETS

Feedstock(s) (organic residuals) →

Process train →

Bioproduct(s)

Capital ($$, NatCap, Social, Informational)

Logistics (Hauling, Transport, Pipes)

BTW, these Bioproducts markets are, in turn, integrated with the WATER & ENERGY utility and product markets… but that's another story! … an important one!

What's a "market"?

John Chamberlain –

"When two subjective senses of value meet in an objective price,

*a **market** is born."*

***Marketing** is giving people*

what they want.

***Sales** is giving people*

what you have.

Feedstock "Control"–Monopoly

CREATE LOCAL "MONOPOLIES"

Rationale:

- ***Reduce redundant Investments***
- ***Own/control the material***
- ***Ratepayers and material ownership is BANKABLE!***

Examples:

- ***Wastewater Treatment Plants****, by law, control our poop, and therefore the biosolids, water and energy products that are produced*
- ***Hauler Franchise Agreements/Contracts:*** *Waste collectors serve the ratepayers, and take ownership of the discards*
- ***Agricultural and Forest Residuals****: Own both the cultivated products* and *the residuals*

Programs: Developing the Organics Value Cycle

Food Scraps Example

- *Become a biorefinery developer!!*

- ***Source Separation***
  - *Disposers to POTW's*
  - *Food scraps in the Green Bin*
  - *Onsite Processors*
- ***MRF Separation (Materials Recovery Facility)***
  - *Food Scraps to Anaerobic Digestion*
  - *Food Scraps & Green Material to Composting*
- ***Processing***
  - *Composting*
  - *Anaerobic Digestion*
  - *Bio Products*
- ***Marketing, Use (& Generation, again)***
  - *We are all "user/generators" (not "consumers")*
  - *Marketing Product Use within the Organics Value Cycle*

Feedstock "Control"–Markets

CREATE LOCAL "MARKETS"

Rationale:

- ***Generator is the primary "owner"***
- ***Reduce transportation if managed onsite***
- ***Ratepayers and material ownership is BANKABLE!***

Examples: - onsite/neighborhood

- ***Wastewater:*** *Greywater and composting toilets*
- ***Solid Waste:*** *Reduce, compost or biogas and/or self haul*
- ***Agricultural and Forest Residuals:*** *Reduce, compost or biogas and/or self haul*

Process Technology Train

Technology Categories

- ***Chip & Grind***
- ***Composting***
- ***Animal Feed***
- ***Anaerobic Digestion***
- ***Thermochemical***
- ***Microbial Fermentation***

Competitive Dimensions

SCALE: *small, medium or large; <12.5K ⟺ 50K ⟺ >200K/year*

CAPITAL COST: *per ton of annual throughput*

OPERATING COST: *per ton of annual throughput*

REGULATORY DYNAMICS: *develop and change of state, region and local regulations*

LOCAL ACCEPTANCE: *of both the bioproducts & env. impacts*

Local Bioproduct Markets

Organic Product Category	Technology Options	Technology/ Facility Capital Cost Range	Current Market Value Range of Finished Products
Mulch	Chop & Drop, Chip/Grind & Reuse, Chip & Ship	**$2-10/tpy**	**$0-$15/ton (FOB)**
Compost	Backyard, Container, Windrow, eASP, Gore, ECS, enclosed, AgBag, Vermicompost, etc.	**$25-$450/tpy**	**$10-$30/ton - bulk (whsl), $80-120/ton - bagged (retail)**
Animal Feed	straight foodscraps, food dehydrator/cooker, aquaponics	**$10-$750/tpy**	**$50-$150/ton**
Biofertilizer	High nitrogen composting, biosolids pellets, manure pellets	**$100-$800/tpy**	**$80-200/ton**
Electricity	Anerobic Digestion --> Methane --> gas turbine	**$200-$850/tpy**	**$150-$300/ton**
Biofuel	Anerobic Digestion --> Methane Pyrolytic Conversion --> methanol, ethanol, biodiesel, etc.	**$250-$900/tpy**	**$250-$750/ton**
Chemicals	Distributed Biorefinery (emerging)	**$300-$1,000/tpy**	**$500-$10,000/ton**
Product Materials	ecorUSA.com	**$500-$1,500/tpy**	**$500-$10,000/ton**

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- Association of Compost Producers
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- Organics to Bioproduct "Markets"
- **Integrated Market Assessments & Plan**

Integrated Market Assessments & Models

Product quality

the best product, for the lowest price

Trashy

vs.

Premium

GARDEN KELLOGG PRODUCTS

Proven Organic.

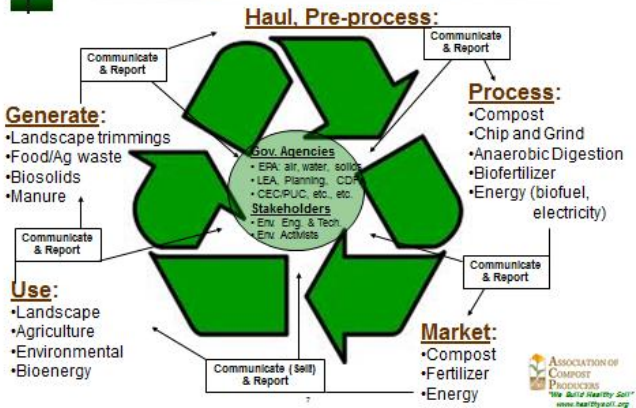
Selling the whole, integrated "value cycles"

e.g. LOOP

LOOPforYourSoil.org

loop

The Organics Value Cycle



Markets – Capacity and Markets go hand in hand

We are creating a new narrative, a new story, for our food AND discards:

- <u>Addressing key new questions</u> -

- ***Where did our food and other products come from?***
- ***How healthy is it, are they?***
- ***Was it made with love … and compost?!***

- ***Where do our discards go?***
- ***Do we keep it clean, for the compost pile?***
- ***Do we make/buy & use compost?***

Education and Marketing

Education:

- ***Teaching or training people to "do it them selves" (DIY)***

Pros:

- Empowers people, & low cost solution
- Government & industry doesn't have to deal with it
- Organics value cycle is already personal

Cons:

- Requires attention, higher burden
- Can be inconvenient and messy

Marketing:

- ***Providing a specific solution "for a price"***

"We'll take care of it" – Burrtec

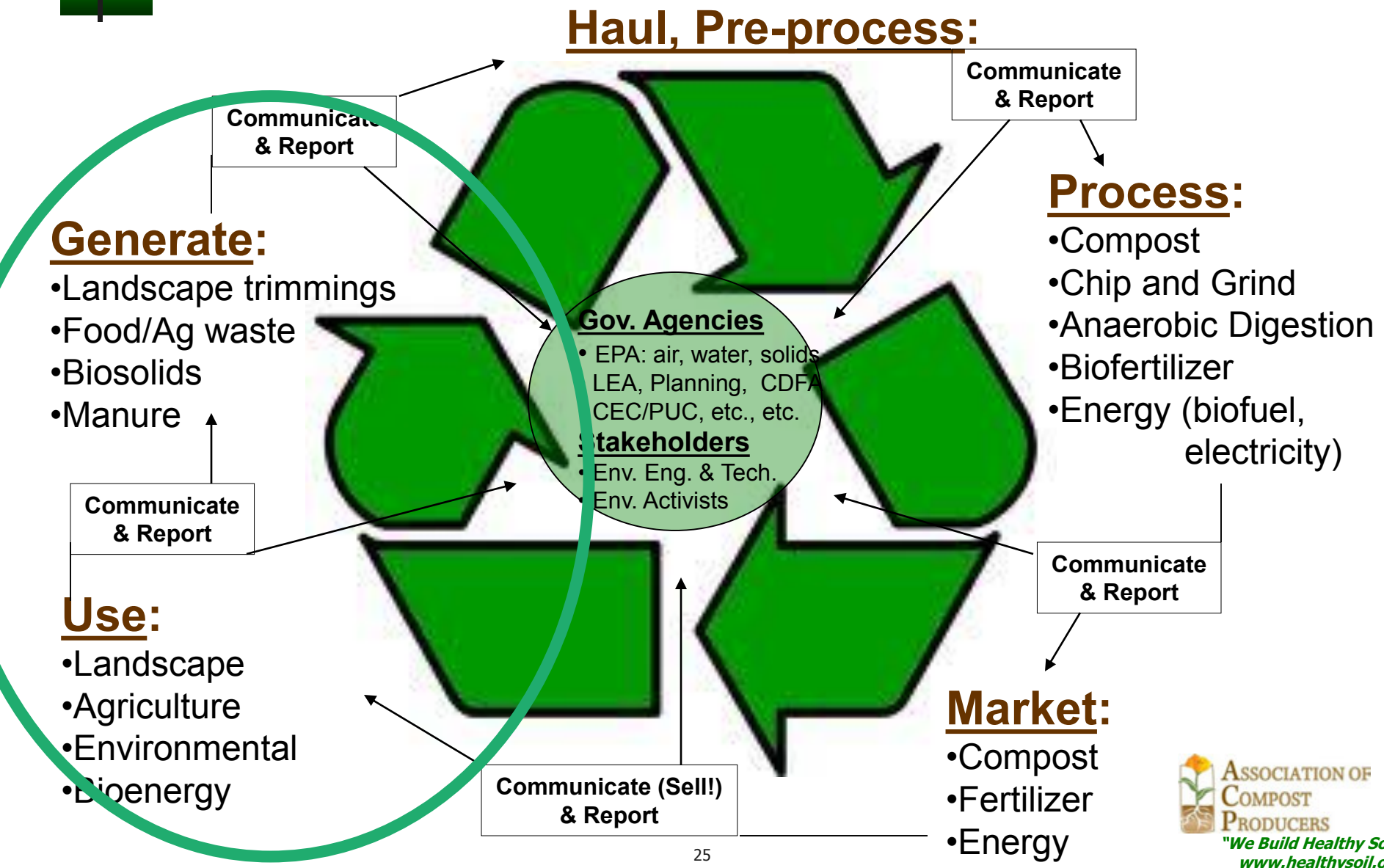
Pros:

- Convenience - others do the dirty work
- Can leverage economies of scale

Cons:

- Disconnects users from resource cycle, still feels like consumer, not user
- Must now market use of material

The Organics Value Cycle



Build a Sustainable Enterprise Model: *Strategy/Policy into Products*

Assess Markets → Plan → Invest → Launch → Operate

- ***Feedstock Assessment***
  - Residual Generation Sources
  - Catalogue of Options
- ***Technology Assessment***
  - Product Appropriate
  - Scope to Scale Specific
  - Value and Investment Desired
- ***Bioproduct Market Assessment***
  - Product Specific
  - Brand Value Options
  - Channel Availability
- ***Capital Assessment***
  - Capital Elements Available (4 types- monetary, natural, social, info
  - Sources Available & Alignment

Bioproduct Industry Database

- ***Enterprise Plan***
  - Manufacturing & Operations
  - Marketing & Sales
  - Finance & Accounting

- ***Invest & Build***
  - Venture, Debt, Bond, User Fees
  - Operational Training
  - Merchandising & PR
- ***Commission Facility(s)***
  - Trial Runs
  - Hiring
  - Press Releases, Sales
- ***Launch & Operate***

Enterprise Planning → PLAN

Develop Models and Scenarios

Enterprise Type	FEEDSTOCK (Type & Rev.)	SCALE (tpy)	PROCESS TRAIN	MARKET MODEL	BIOPRODUCT PORTFOLIO
Public (wastewater)					
Public (municipal solid waste)	✓	✓	✓	✓	✓
Private (waste hauler/recycler)					
Private (agriculture)					
Public/Private (forest)					

Develop your unique enterprise business model… which becomes your <u>BRAND!</u>

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Questions?
Comments?
Discussion…

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