

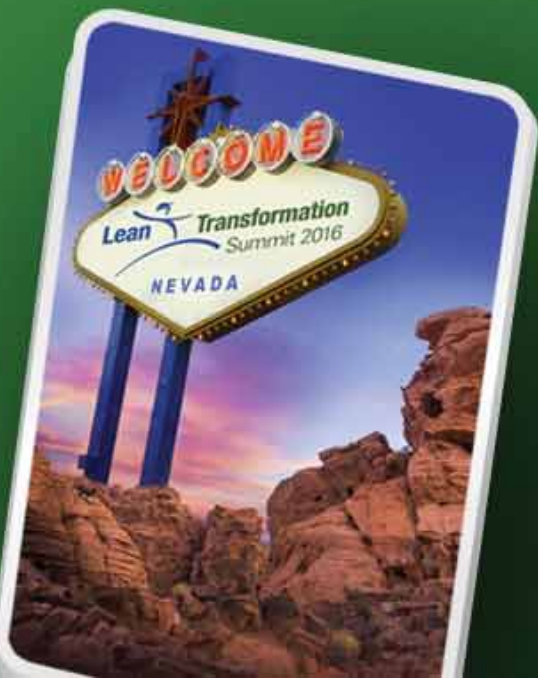
SunPower Corporation

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@MartyNeese

2-29-16



Let's Deal With The Work

March 17-18, 2016 | Las Vegas

SunPower At A Glance

Solar Technology and Energy Services Provider



RESIDENTIAL



COMMERCIAL



POWER PLANTS

- 2015 revenue >\$2.5 billion
- > 10,000 employees & JV partners
- > 6 GW solar PV deployed
- Strategic investment by Total SA: #10, F500²
- Record breaking solar cell and panel efficiency¹
- > 600 patents worldwide
- Global diversity: homes to power plants
- ~1,800 dealer partners worldwide



¹ SunPower holds the world-record large Silicon panel efficiency (21.4%). Green, M. A., et. al. "Solar Cell Efficiency Tables (version 39)," Progress in Photovoltaics, 2013, vol. 21, p1-11
² Source: 2013 Fortune 500 Global Ranking

Residential Distributed Generation



Commercial Distributed Generation



Power Plants



Lean Transformation Journey

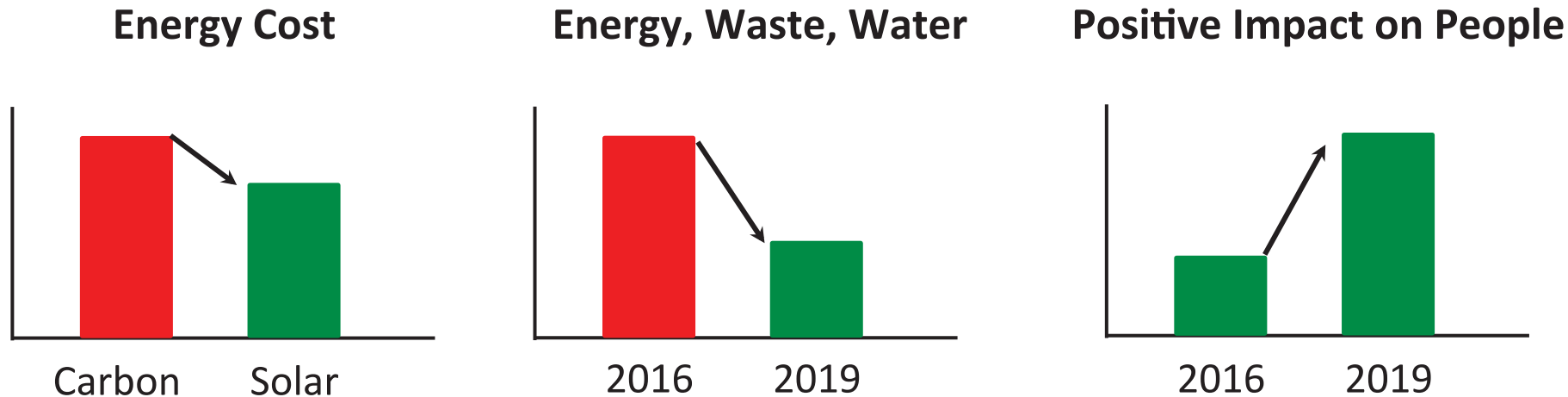
- Our Transformation Framework
- Our Results from 2011 – 2015



1. What problem are we trying to solve?

Purpose: We change the way our world is powered.

Mission: a.k.a. “the work to be done”



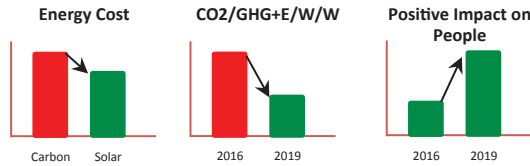
Values: a.k.a. “our culture and how we conduct ourselves every day”



PURPOSE

We change the way our world is powered

Mission

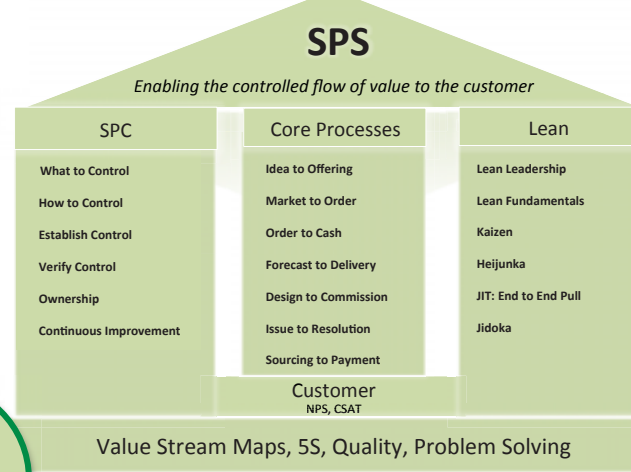


Values



PROCESS

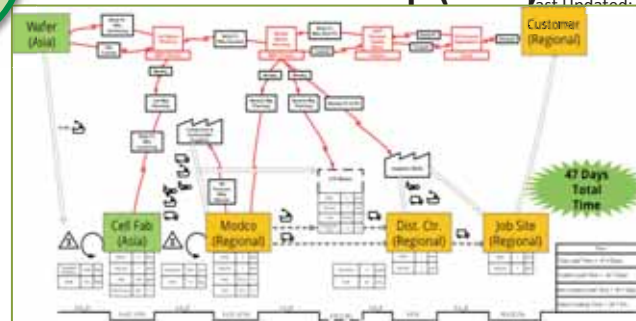
SunPower Production System



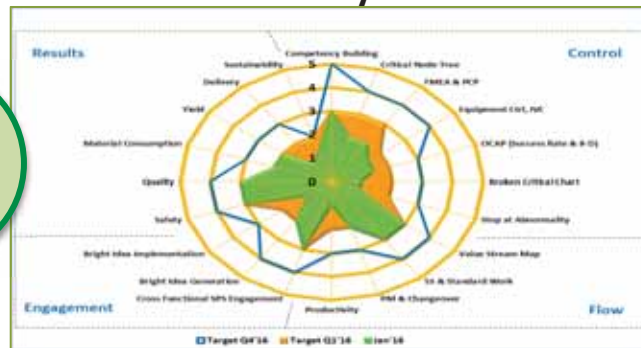
1

2

Value Stream Map (VSM)



SPS Maturity Tracker



2. Process Improvement

Process, Site and End-to-End Value Stream Map improvement through:

- extensive use of kaizens
- problem solving
- closed-loop learning

3. Capability Development

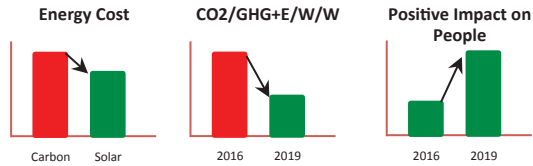
Team, Process, Site and Enterprise Maturity Tracker:

- Control
- Flow
- Engagement
- Results

PURPOSE

We change the way our world is powered

Mission



Values

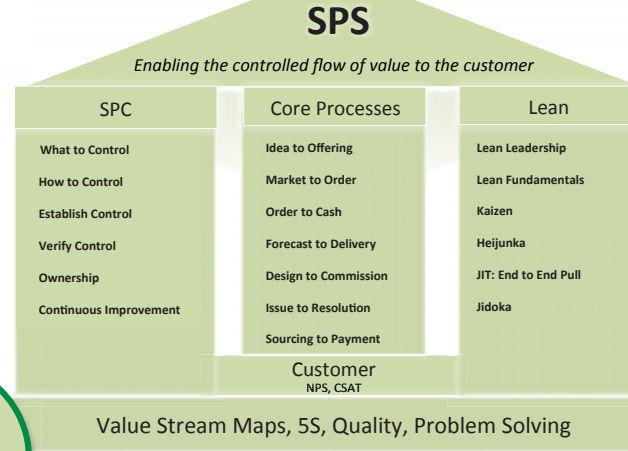


Strategy Development & Deployment:
MYP, AOP, A3 & Key Initiatives



PROCESS

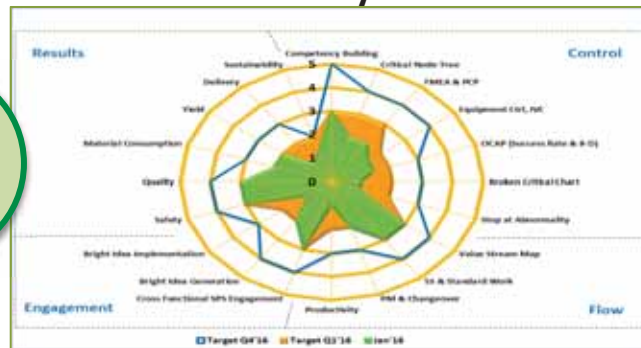
SunPower Production System



Value Stream Map (VSM)



SPS Maturity Tracker



4. Management System

- **Strategy Development:** Multi-Year Plan (MYP) & Objectives
- **Strategy Deployment:** Annual Operating Plan (AOP)
- **Deployed using A3** and supported by **compensable Key Initiatives**

PURPOSE

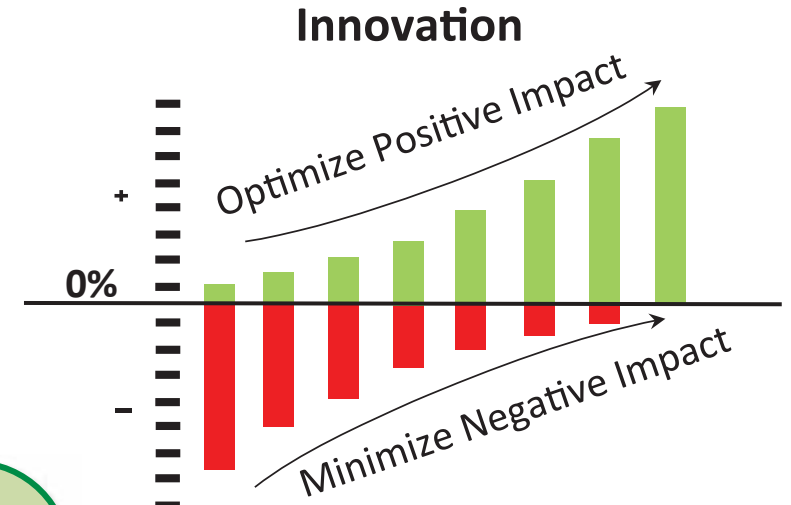
PROCESS

PEOPLE

5. Basic Thinking, Mindset

- Culture wins over strategy every time
- Unlocking the potential of our people is a process
- We want people to do and be their very best
- Engaged, motivated, joyful people can solve any problem

5-Shifted: Being less bad is not the same as being good!



5

Development

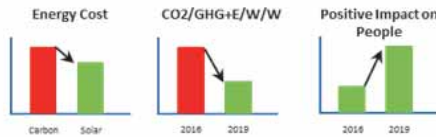


2015 Purpose, Process, People

PURPOSE

We change the way our world is powered

Mission



Values

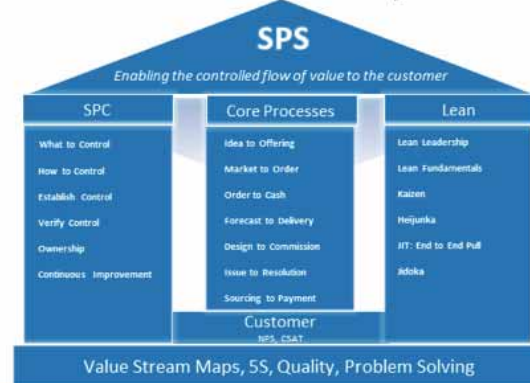


Strategy Development & Deployment:
MYP, AOP, A3 & Key Initiatives

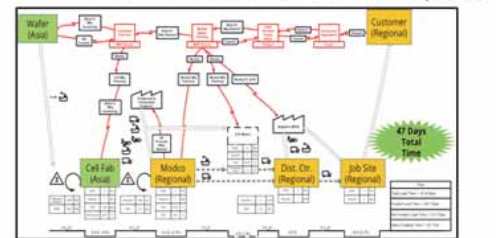


PROCESS

SunPower Production System



Value Stream Map (VSM)

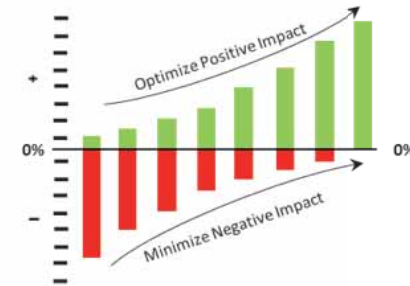


SPS Maturity Tracker



PEOPLE

Innovation



Development



Simplified Value Stream: Information Flow



Inter-Disciplinary
SunPower Call Center

Global Customers:
Go-To-Market Channels



**GLOBAL BUSINESS & FINANCE
SUPPORT**



POWER PLANTS



DISTRIBUTED GENERATION

Polysilicon
Suppliers

Ingot
Suppliers

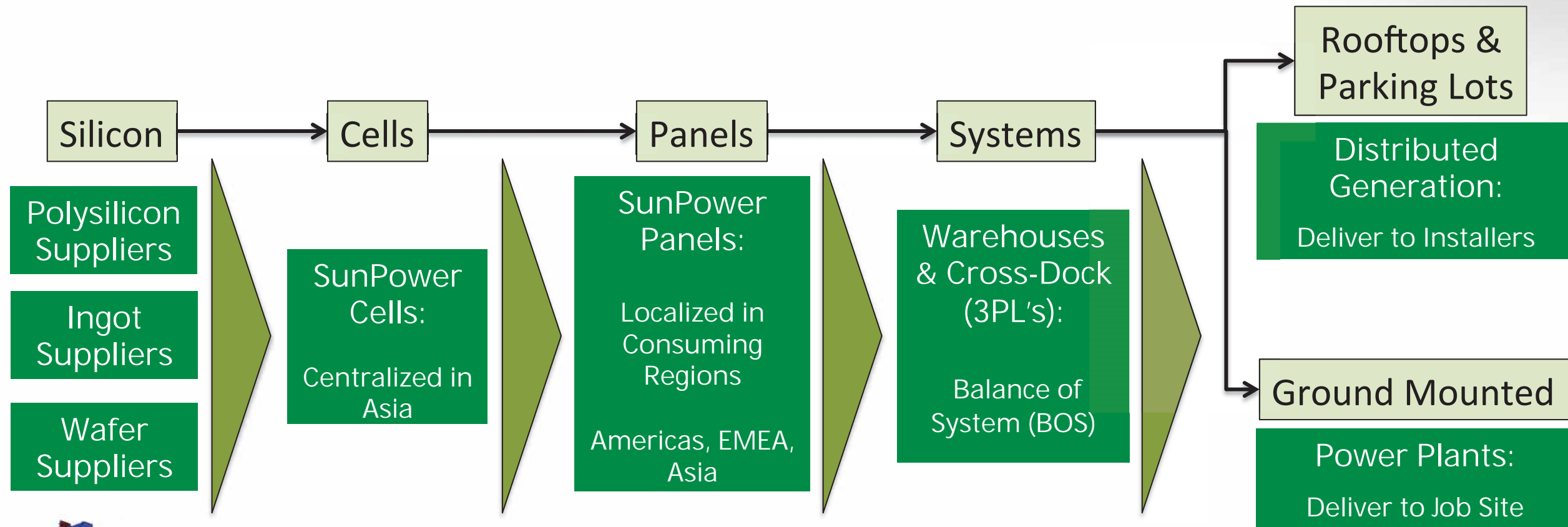
Wafer
Suppliers

SunPower
Cells

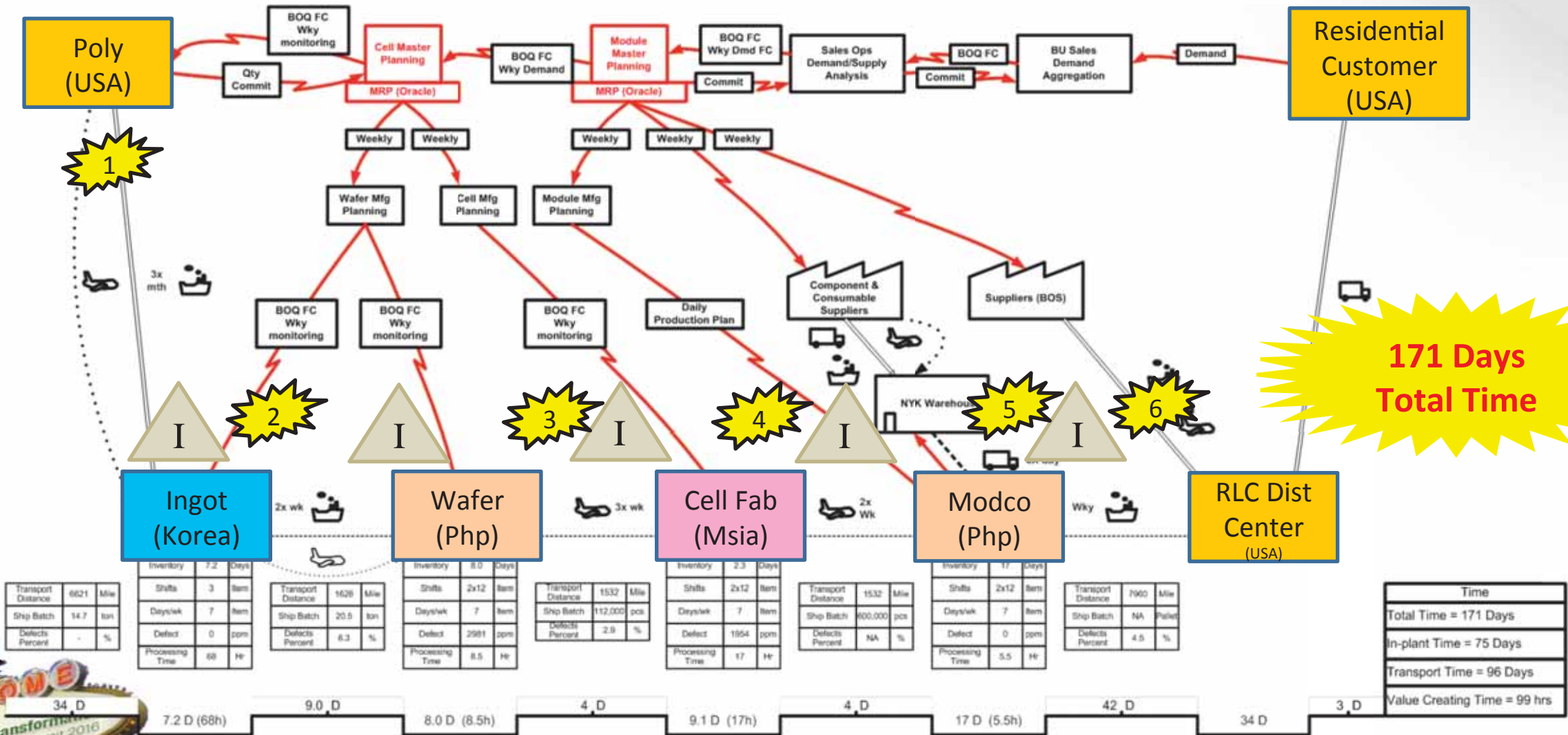
SunPower
Panels



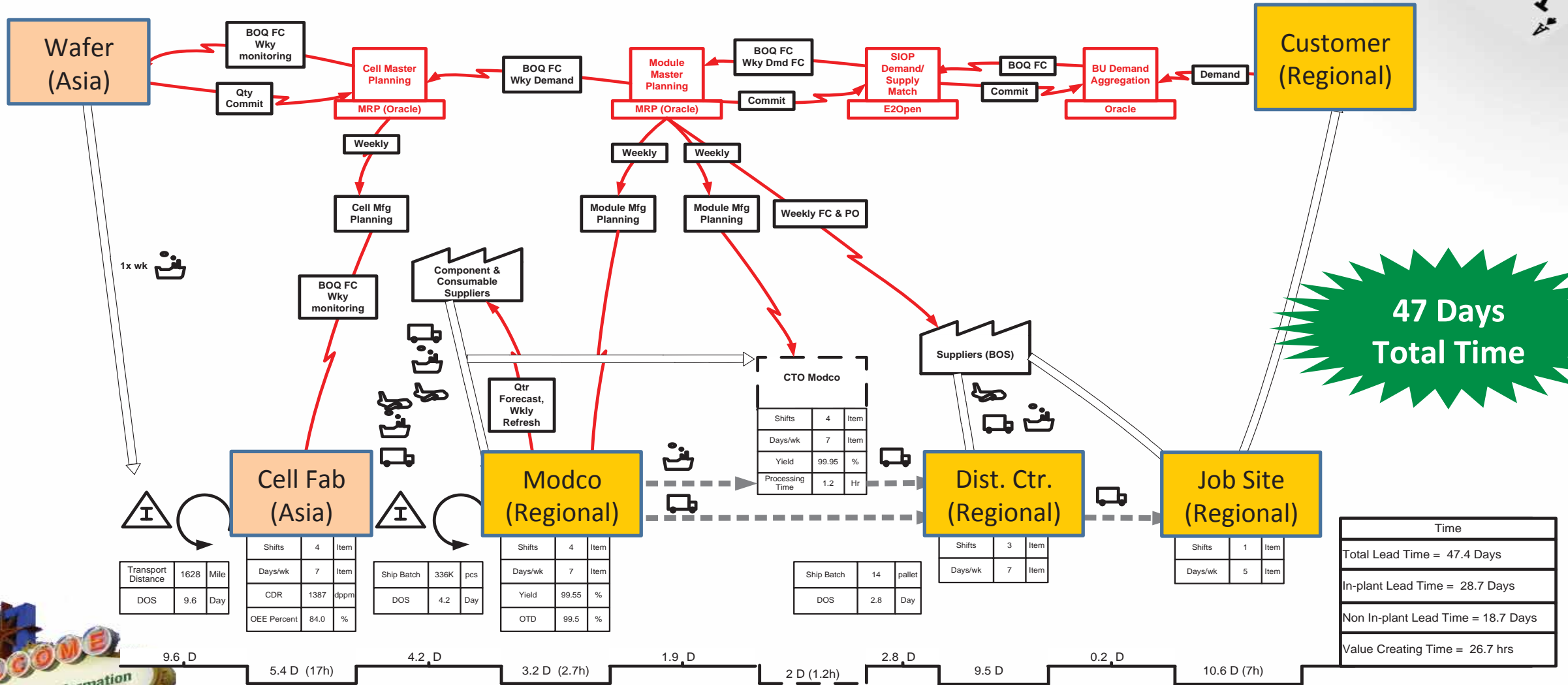
Simplified Value Stream: Physical Flow



2011 – Starting Our Journey



2015 Current State



Key Performance Metrics



Information Flow	2011 to 2015 Improvement
New Customers	256%
GW's Deployed	61%
Customer Experience Net Promoter Score (NPS)	19%
Safety – Total Recordable Incident Rate (%)	43%
Gross Margin (%)	68%
Product Evolution: PV to Complete Solutions	6

Physical Flow	2011 to 2015 Improvement
End to End VSM Lead Time (Days)	72%
Total Cost	48%
Cell Fab Output Above Designed Capacity	43%
Cell Technology Generations	4
Module Manufacturing Labor Productivity	39%
Customer Quality: Corrective Action Requests	96%

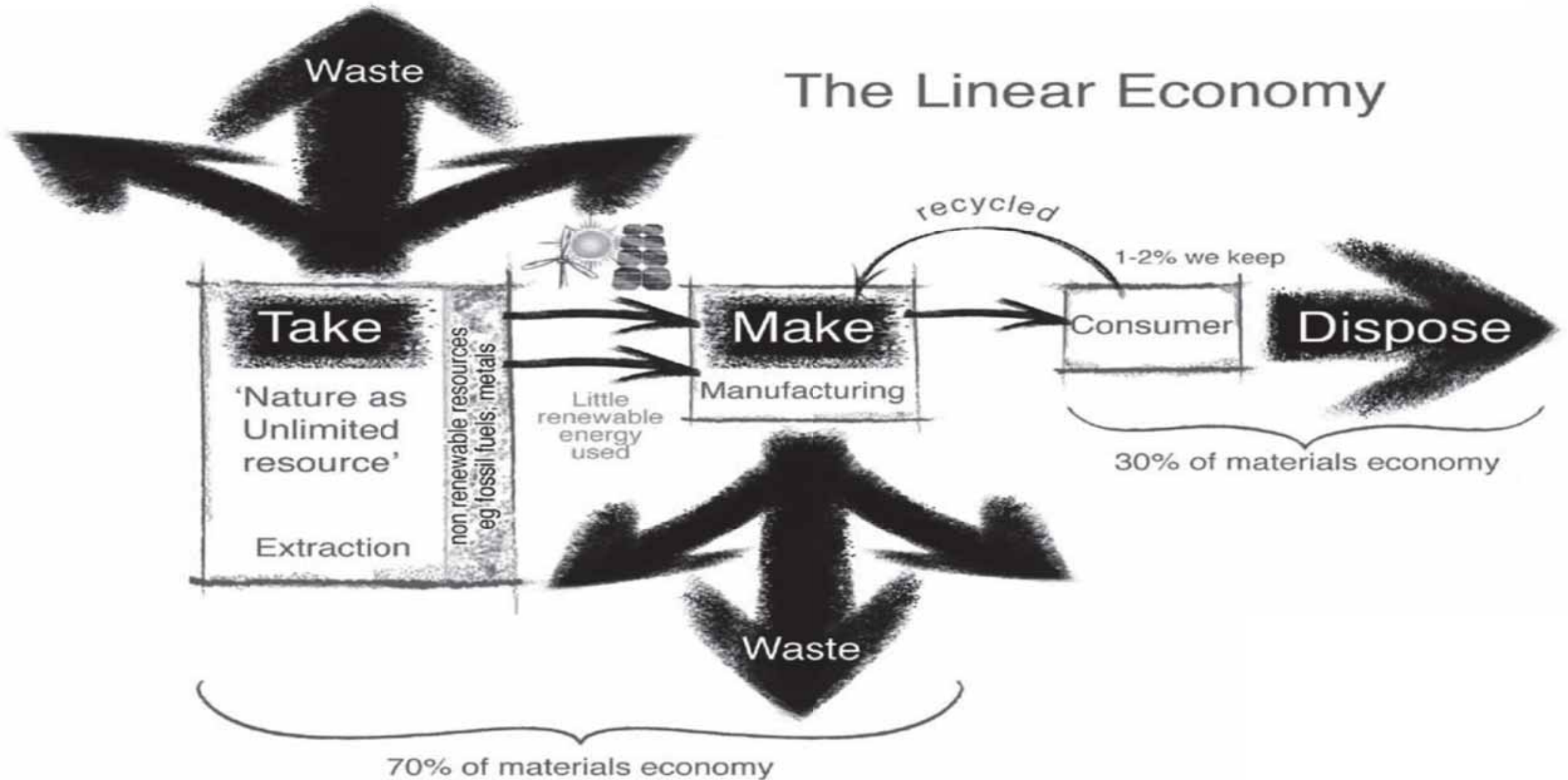


Circular Economy

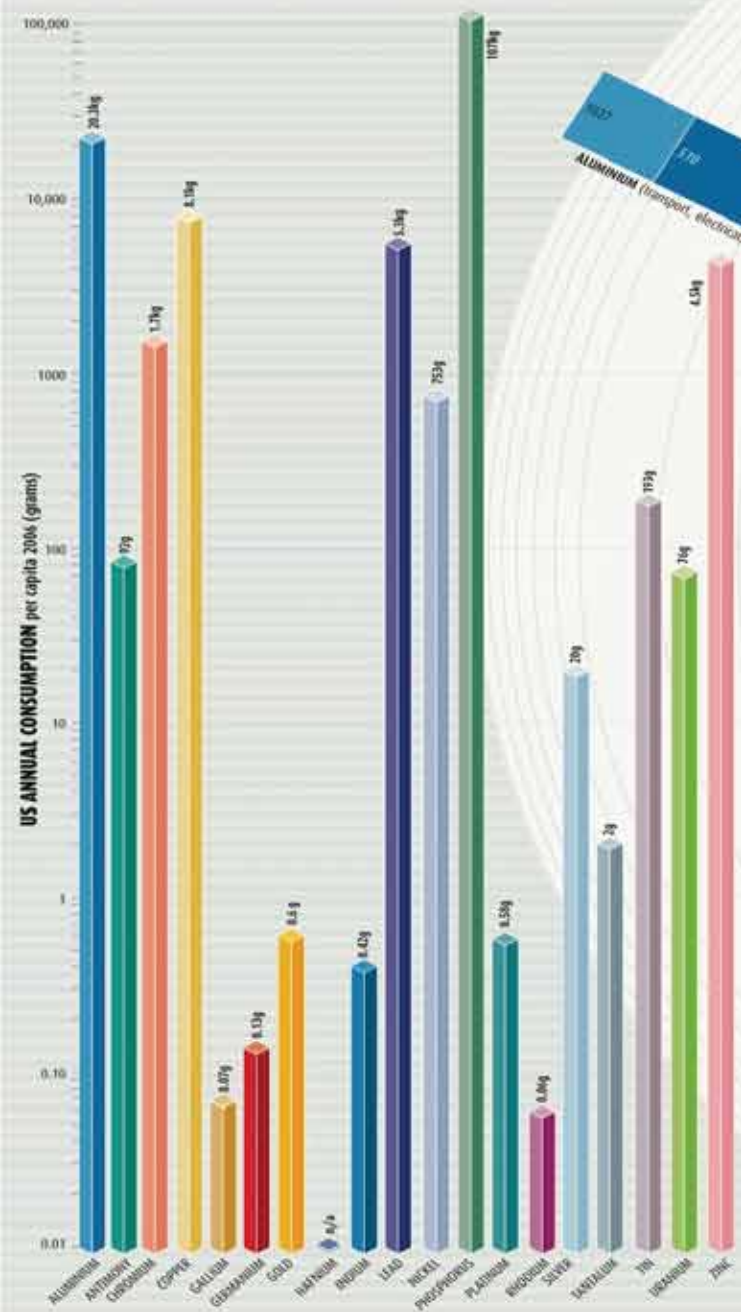
- Introduction to the Circular Economy
- Circular + Lean = “CLEan Thinking”



The Linear Economy



HOW LONG WILL IT LAST?



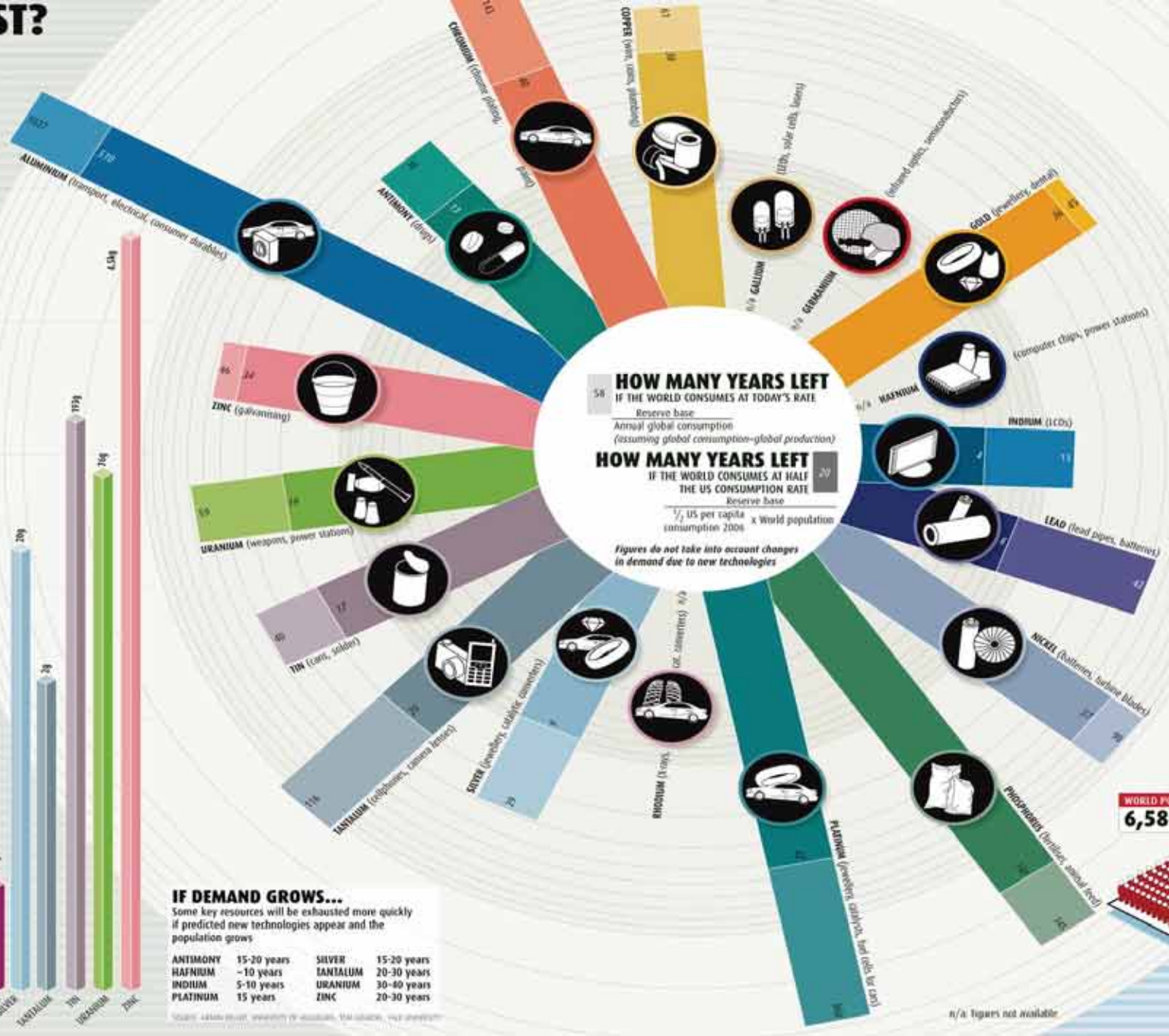
IF DEMAND GROWS...
Some key resources will be exhausted more quickly if predicted new technologies appear and the population grows

ANTIMONY	15-20 years	SILVER	15-20 years
HAFNIUM	~ 10 years	TANTALUM	20-30 years
INDIUM	5-10 years	URANIUM	30-40 years
PLATINUM	15 years	ZINC	20-30 years

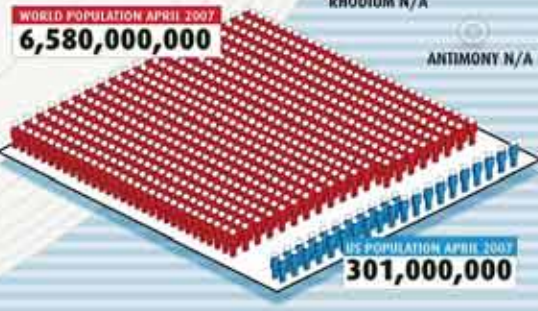
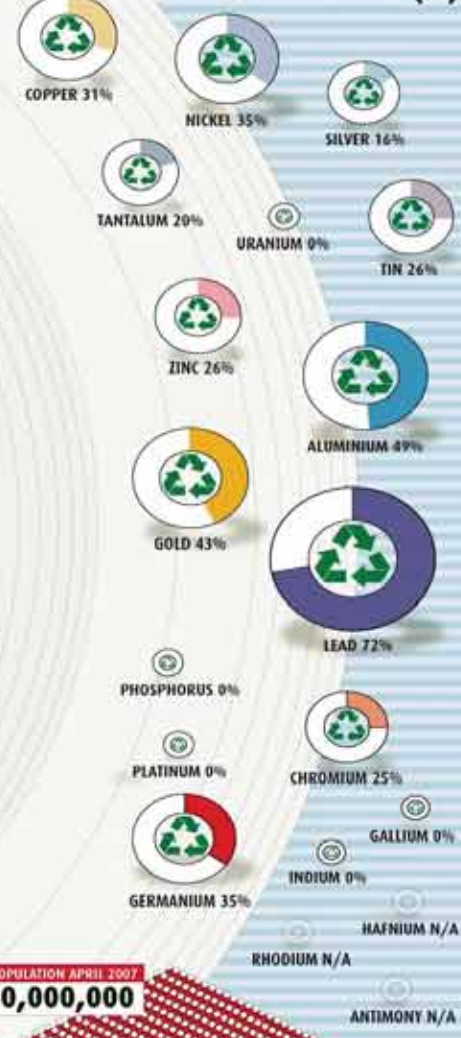
HOW MANY YEARS LEFT
IF THE WORLD CONSUMES AT TODAY'S RATE
Reserve base
Annual global consumption (assuming global consumption=global production)

HOW MANY YEARS LEFT
IF THE WORLD CONSUMES AT HALF THE US CONSUMPTION RATE
Reserve base
 $\frac{1}{2}$ US per capita x World population consumption 2006

Figures do not take into account changes in demand due to new technologies

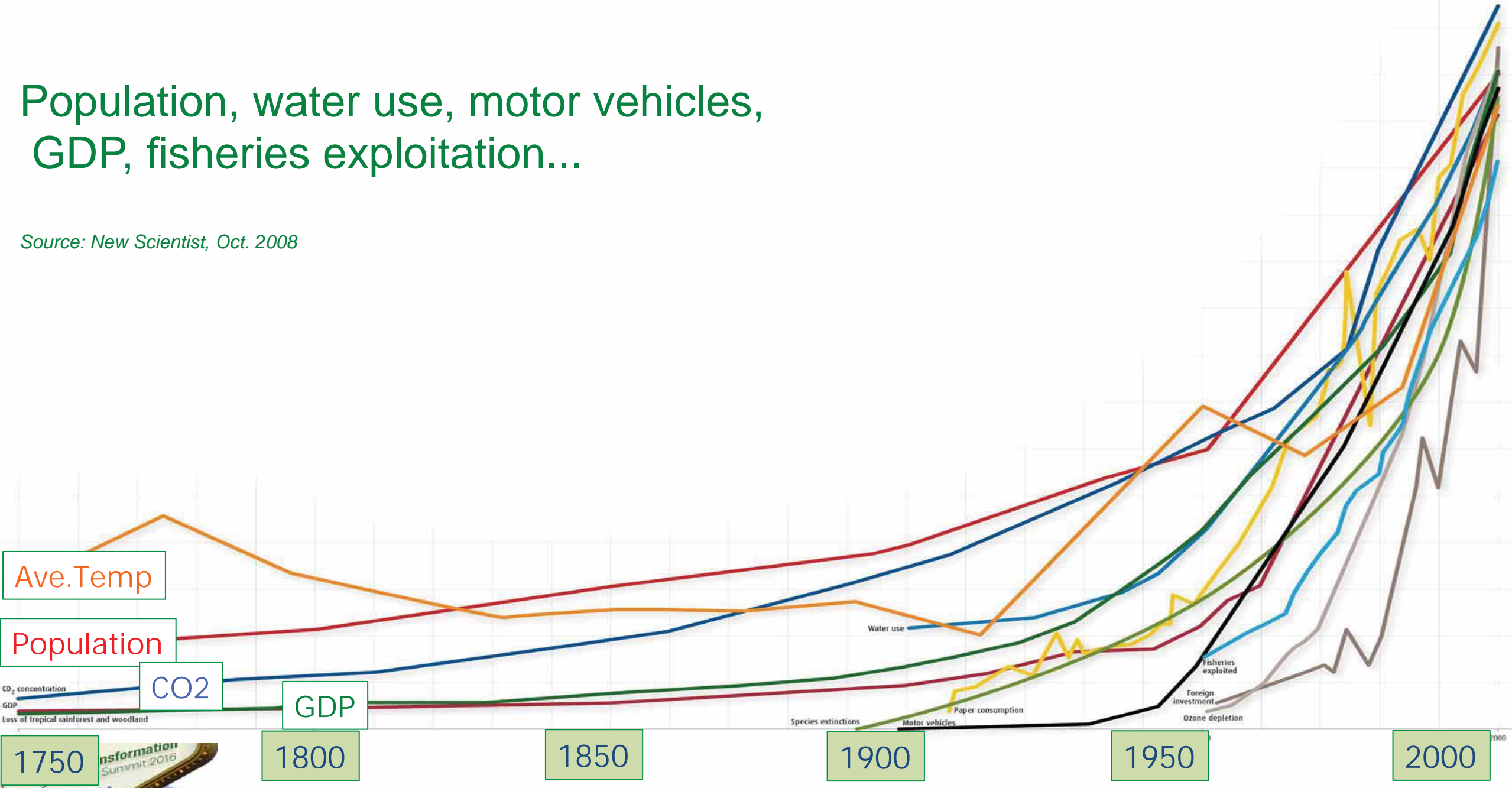


PROPORTION OF CONSUMPTION MET BY RECYCLED MATERIALS (%)

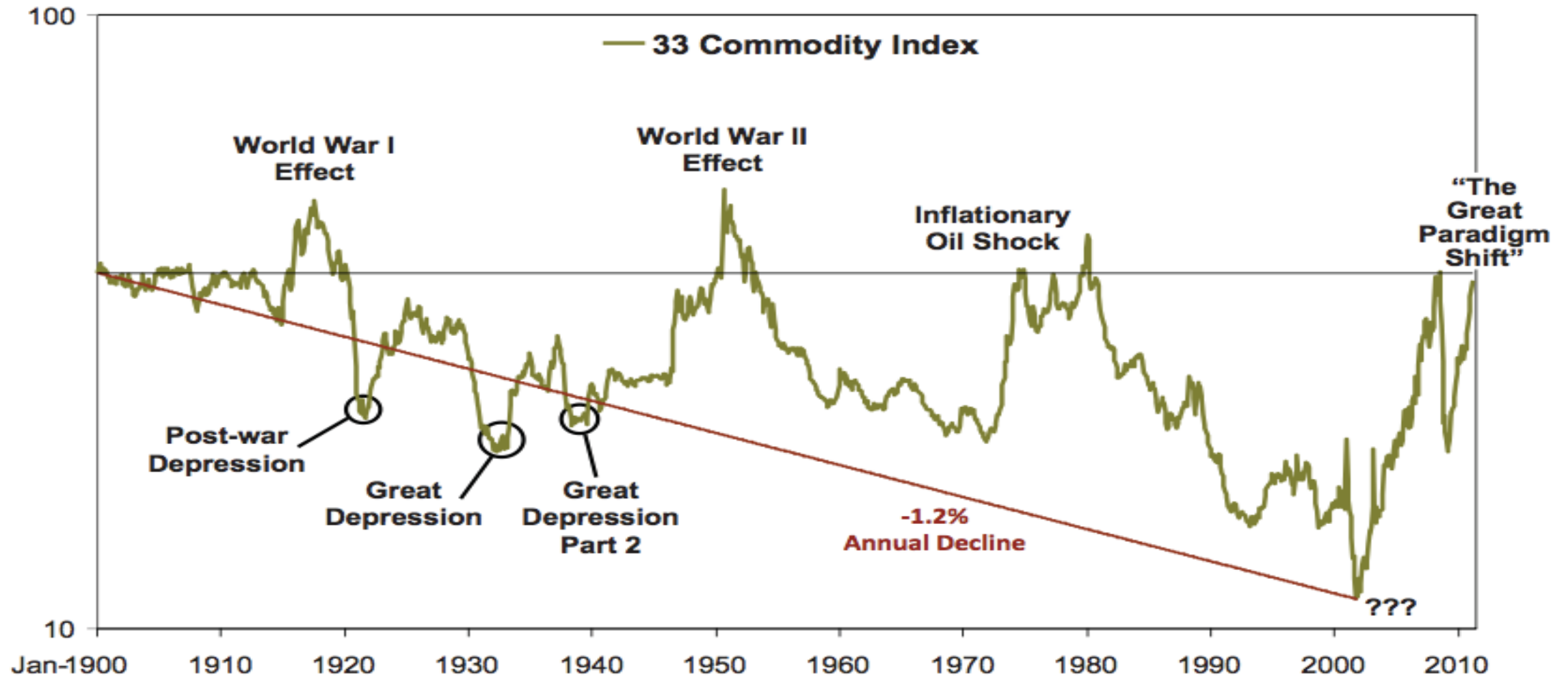


Population, water use, motor vehicles, GDP, fisheries exploitation...

Source: New Scientist, Oct. 2008



GMO Commodity Index: The Great Paradigm Shift



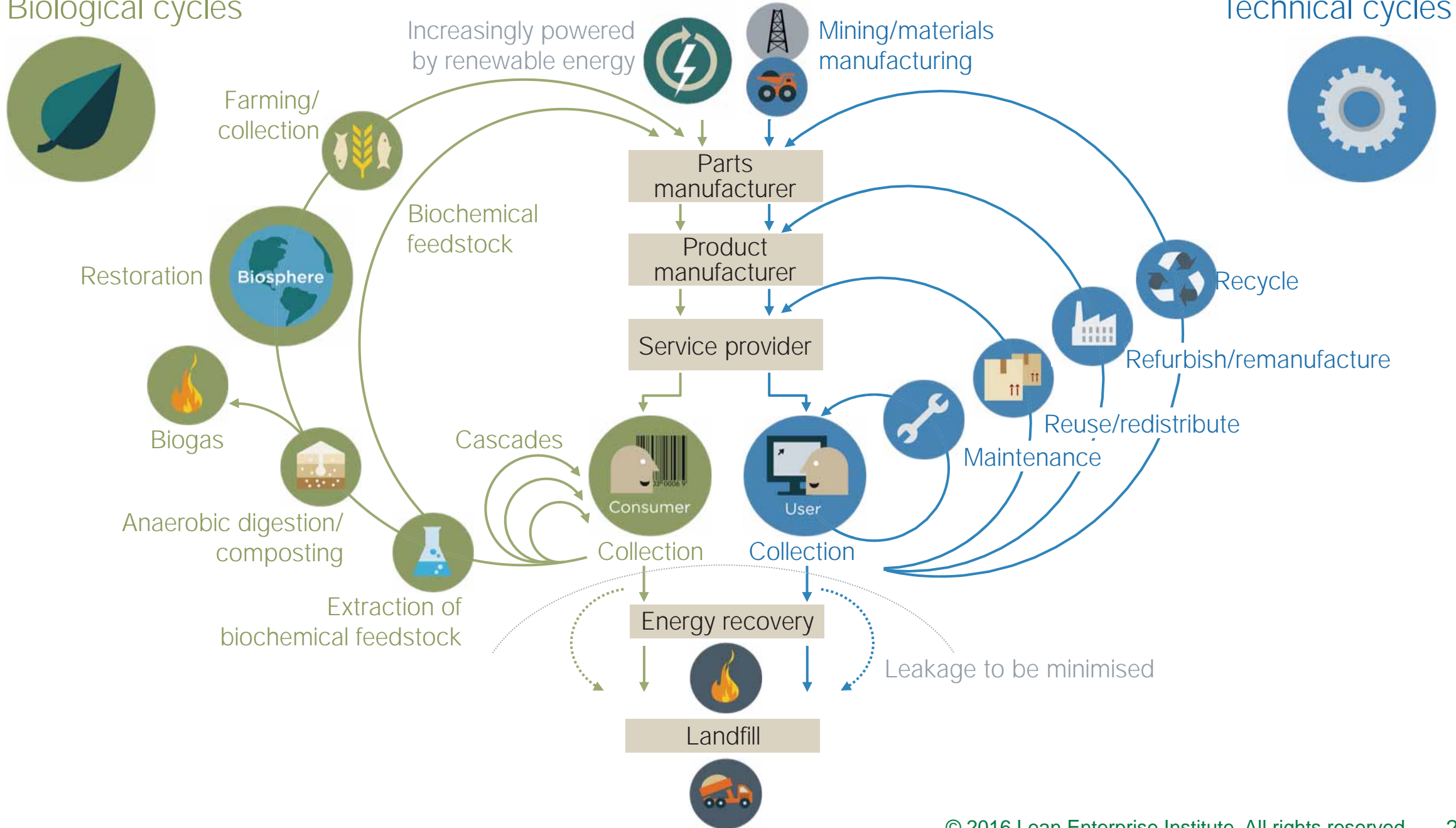
Note: The GMO commodity index is an index comprised of the following 33 commodities, equally weighted at initiation: aluminum, coal, coconut oil, coffee, copper, corn, cotton, diammonium phosphate, flaxseed, gold, iron ore, jute, lard, lead, natural gas, nickel, oil, palladium, palm oil, pepper, platinum, plywood, rubber, silver, sorghum, soybeans, sugar, tin, tobacco, uranium, wheat, wool, zinc.

Source: GMO As of 2/28/11



Biological cycles

Technical cycles



Biological cycles

Technical cycles

Increasingly powered
by renewable energy



Step 4: Triple Certified – Zero to landfill, eco-friendly factories, maximum use of PV

Step 3: Reuse/Recycle – Enabled the reuse and recycling of all materials (Aluminum, Silicon, Copper & Glass >97% of BOM)

Step 2: Quality – Made the product more robust, simple and inexpensive to maintain

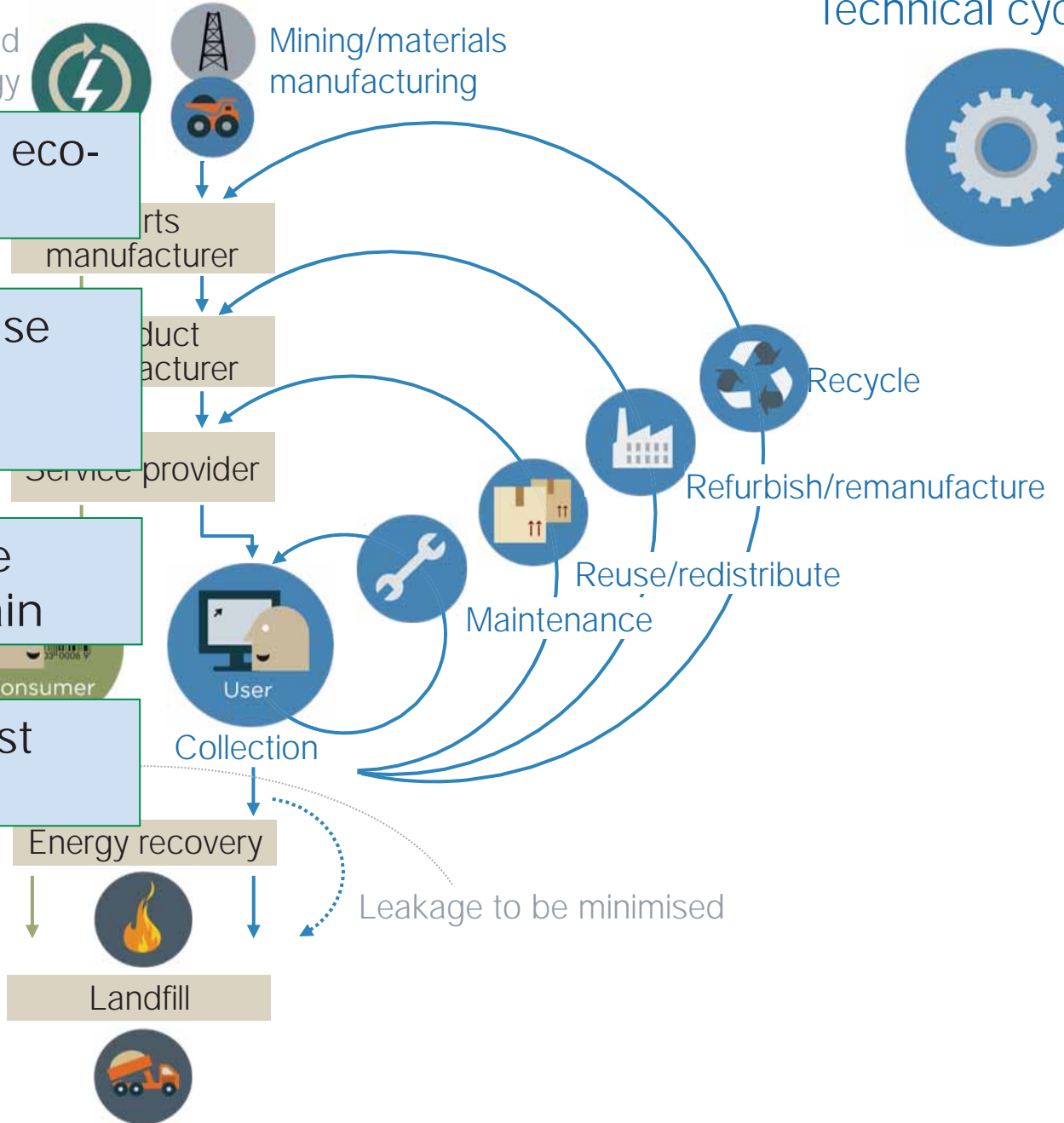
Step 1: Reliability – Made the product last longer - from 25 to 40 years

Extraction of
biochemical feedstock

Energy recovery

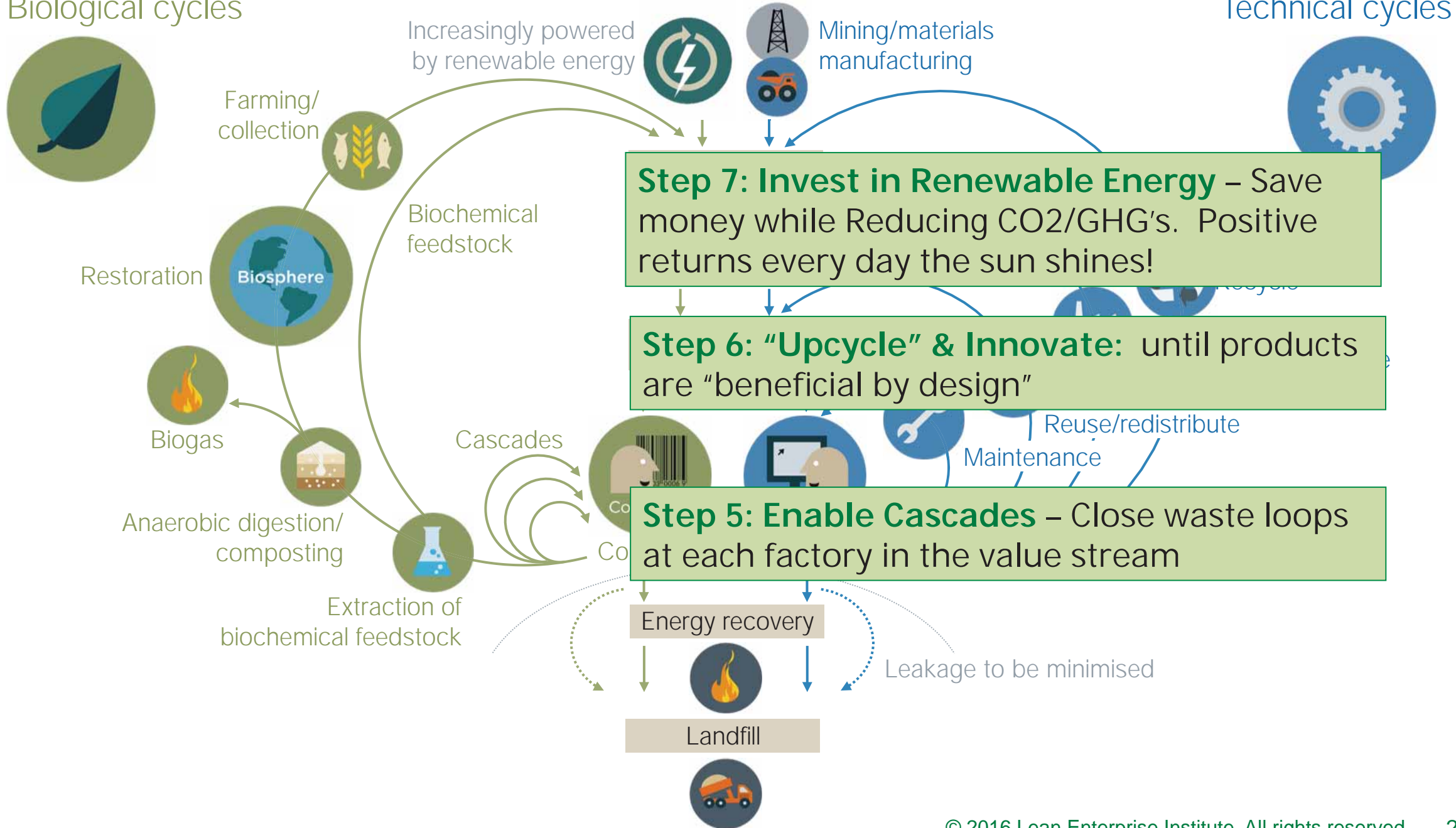
Landfill

Leakage to be minimised

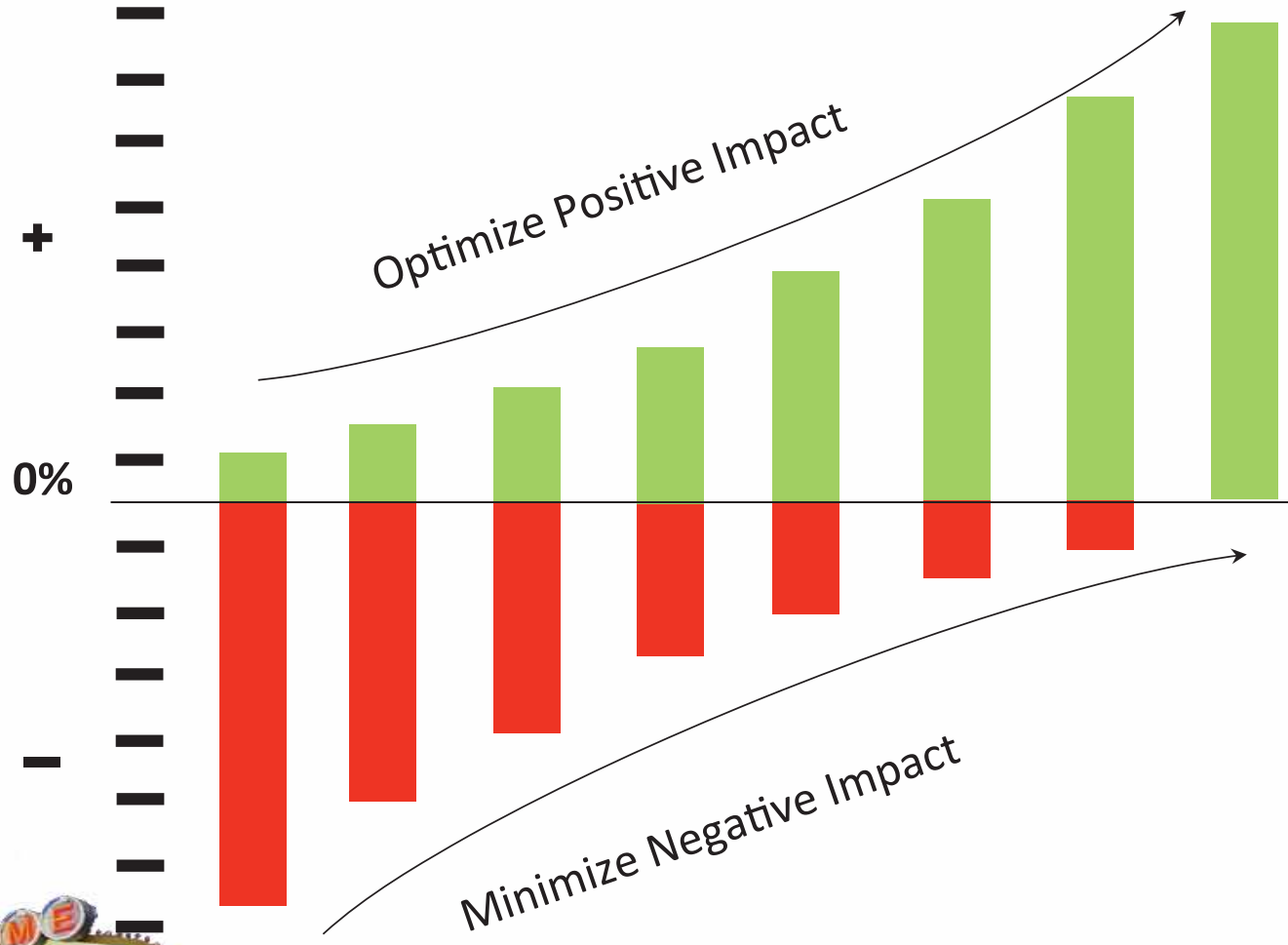


Biological cycles

Technical cycles



Upcycling – A Mindset Shift



- (>+) Energy & Restoration System?
- (>+) No Plating, Dry Processing?
- (>+) Cradle to Cradle for BOM
- (<-) Land Use?
- (<-) Plating, Wet Processing?
- (<-) Zero Waste To Landfill, LEED



Business Models

- Power Plant Asset Ownership via Yieldco & 8point3 IPO
- Smart Energy as a Service
- R&D: Agricultural Uses, Carbon Capture and Soil Restoration



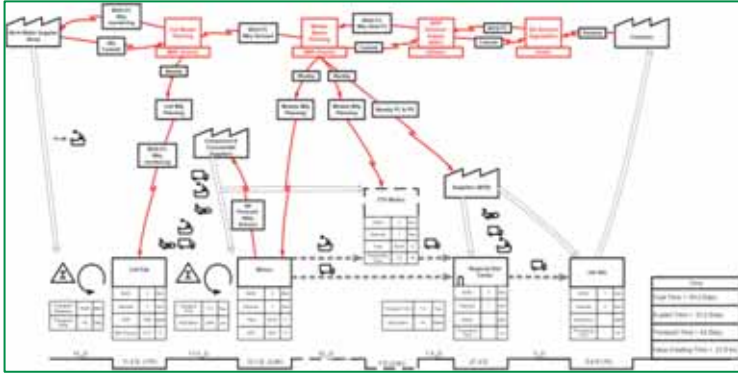
Business Models: Rooftop, Carport & Tracker Systems

- Typical Customer saves more than 30% on energy costs
- 1MW of solar reduces CO2 by > 1200 metric tons / year / site



“CLEAN Thinking”

Integrating Wisdom from our Sensei’s



Linear Economy – An industrial system historically based on infinite resources “Take, Make, Dispose”

- **Lean:** Enable the controlled flow of value to the customer
- **Sensei Teaches: “Muda”** – “learn to see” and optimize resource allocation, reduce and eliminate muda, mura, muri. Gemba emphasis: “Go see, ask why, show respect”.
- **System Effectiveness Measurement:** “Throughput”

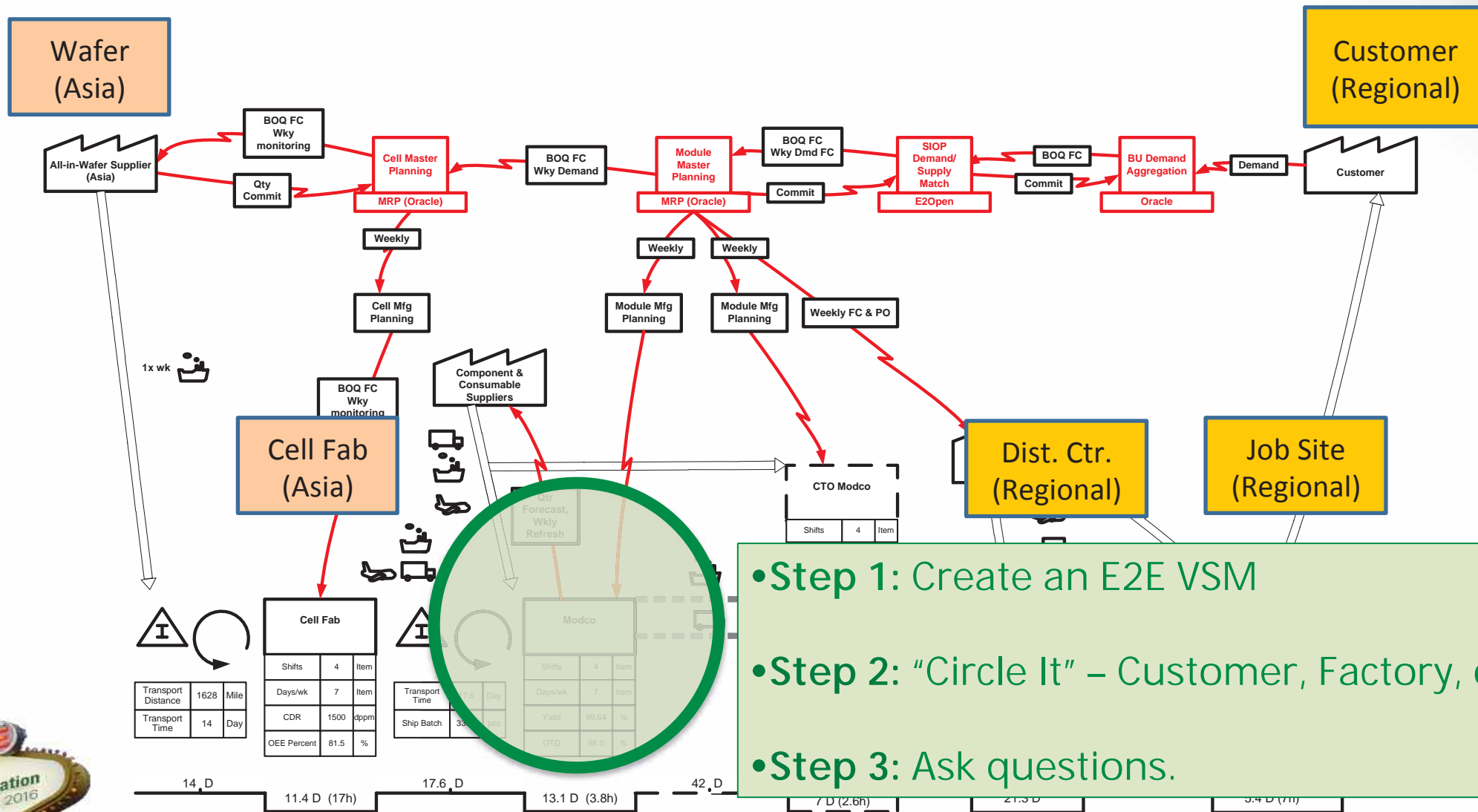


Circular Economy – An industrial system that is restorative by design

- **Circular:** Enable technical and biological cycles to flow endlessly in their highest state of value
- **Sensei Teaches: “Mottainai”** or “waste not” – everything is food for the cycles of materials, where resources are used but not used up, where the feedback restores capital and enables additional flows of goods and services. “Reduce. Reuse. Recycle. Restore. Respect.”
- **System Effectiveness Measurement:** “Roundput”



“Clean Thinking” Approach to Mapping and Problem Solving

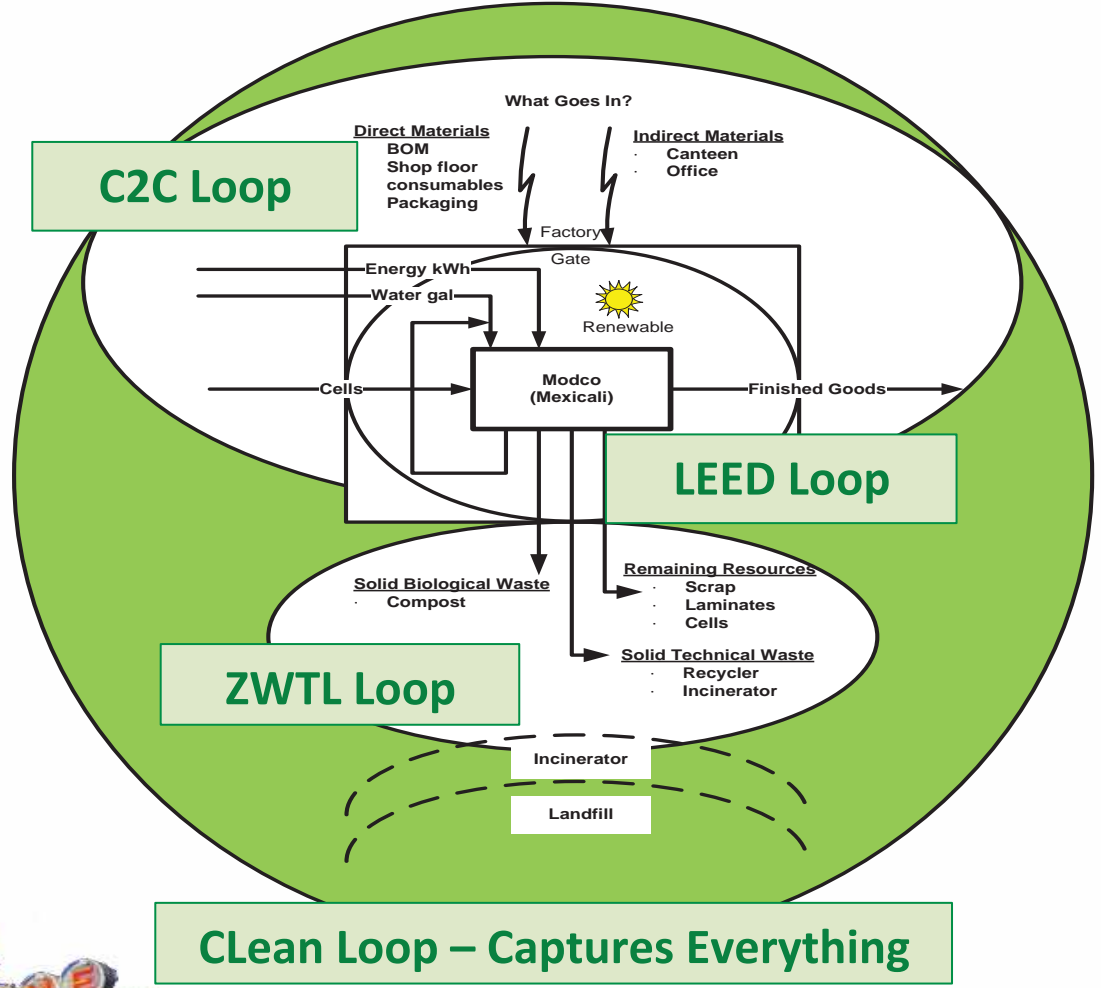


- Step 1: Create an E2E VSM
- Step 2: “Circle It” – Customer, Factory, or Process
- Step 3: Ask questions.



“Clean Thinking”

Technical and Biological Loops



Technical - What goes in? What gets produced?

- What are the ingredients?
- Are they beneficial or harmful?
- Can the Product be taken-back?
- Is there a Re-use/Re-manufacturing loop?
- Can it be Recycled/Upcycled?
- Can it be used as a service?

Biological – What goes out?

- What are your energy, waste and water impacts?
- What does your product do to the biosphere?
- Could it help build or restore natural capital?

Could your product be beneficial by design?



“Clean Thinking”

Triple Certified Factories: C2C, LEED, ZWTL



C2C: Cradle to Cradle

✓ **Mexico, France, Philippines**



LEED: Leadership in Energy & Environmental Design

✓ **Solar Cell Fabs 2, 3, Fab 3 Central Admin Building, Philippines, Mexico (March - pending)**

- 2016: France



ZWTL: Zero Waste to Landfill

✓ **Mexico, France**

- 2016: Philippines



“Clean Thinking”

Integrating Tools and How to Mainstream Approach



Lean Tools

- Gemba / Go See
- VSM
- PFEP
- Visual Management
- 5 Whys / 7 Ways
- ECRS
- Reduce Muda

CLean Tools

- Gemba / Go See
- VSMc (c=circular)
- PFEPi (i=impact)
- Visual Management
- 5 Whys / 7 Ways
- ECRS
- Increase Mottanai: 5R's

How to “mainstream”

Business Units

- Embed in Product Development
- Embed in Core Processes
- Embed in Multi-Year and Annual Plans
- Include in Financial Commitments
- Showcase in Customer Communications and Marketing

Corporate

- **Share publicly in Annual Report & Sustainability Report**
- **CEO: Track and Communicate progress at All Hands every Quarter**



It Is Working? External Acknowledgments

- Guardian – Sustainability Innovation Award
- Silicon Valley Toxics Coalition - #1 Ranking in Annual Sustainability
- Malaysia Fab 3 – Best Companies to Work For in Asia
- Philippines Fab 2 – National Environmental and Industrial Awards
- Mexicali – Q1'16 to be Industry First “Triple Certified Factory”
- SunPower – 2016 Top Analyst Pick for Solar

...and we're here at LEI sharing our story.





THANK YOU

