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Sustainable Supply Chain to Circular Economy

Transitioning from:

TAKE  MAKE  DISPOSE

To a sustainable supply chain that embraces the concepts of a circular economy
Waste Hierarchy - a Sustainable Supply Chain
A circular economy is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.

Shifting the system involves everyone and everything: businesses, governments, and individuals; our cities, our products, and our jobs.
Source: Philips (electronics such as toothbrushes, electronic razors, lighting, etc.)
A Circular Economy Encourages:

- Sustainability and competitiveness in the long term.
- Preserve resources - including some which are increasingly scarce, or subject to price fluctuation
- Save costs for “U.S.” industries by reducing waste
- Unlocks new business opportunities (finding alternative design and new materials)
- Building a new generation of innovative, resource-efficient businesses - making and exporting clean products and services around the globe
- Creating local low and high-skilled jobs
- Create opportunities for social integration and cohesion through building industry networks and valuing what was previously wasted or abandoned.

https://ec.europa.eu/growth/industry/sustainability/circular-economy_en
THE DRIVING FORCES IN A CIRCULAR ECONOMY

- Decouple economic growth from resource constraints
- Reduce negative environmental impacts
- Reduce product liability impacts
- Stimulate creativity in product design and reuse
- RESPOND TO GROWING CONSUMER DEMAND FOR SUSTAINABLE PRODUCTS
- INCREASE PROFITABILITY
Attitudes Towards the Environment

What do you see as the most pressing problem for the environment?

- Plastic waste
- Climate change
- Air pollution
- Depletion of natural resources
- Loss of biodiversity
- Don’t know/None of these

To what extent do you agree or disagree: companies will experience consumer backlash if they do not limit their environmental impact.

- Total Europe: 04% Agree, 27% Neither agree/disagree, 7% Disagree, 50% I don’t know
- Netherlands: 47% Agree, 31% Neither agree/disagree, 11% Disagree, 7% I don’t know
- Czech Republic: 34% Agree, 22% Neither agree/disagree, 10% Disagree, 5% I don’t know
- Belgium: 34% Agree, 23% Neither agree/disagree, 10% Disagree, 5% I don’t know
- Germany: 30% Agree, 27% Neither agree/disagree, 10% Disagree, 5% I don’t know
- Poland: 27% Agree, 27% Neither agree/disagree, 10% Disagree, 5% I don’t know
- Austria: 20% Agree, 24% Neither agree/disagree, 13% Disagree, 5% I don’t know
- Spain: 25% Agree, 25% Neither agree/disagree, 10% Disagree, 5% I don’t know
- Romania: 20% Agree, 20% Neither agree/disagree, 10% Disagree, 5% I don’t know
- France: 17% Agree, 21% Neither agree/disagree, 7% Disagree, 5% I don’t know
- United Kingdom: 20% Agree, 20% Neither agree/disagree, 7% Disagree, 5% I don’t know
- Italy: 20% Agree, 20% Neither agree/disagree, 7% Disagree, 5% I don’t know
- Luxembourg: 10% Agree, 10% Neither agree/disagree, 7% Disagree, 5% I don’t know
- Turkey: 7% Agree, 13% Neither agree/disagree, 9% Disagree, 5% I don’t know
- USA: 11% Agree, 30% Neither agree/disagree, 12% Disagree, 5% I don’t know
- Australia: 10% Agree, 30% Neither agree/disagree, 12% Disagree, 5% I don’t know

To what extent do you agree or disagree with the statement: protecting the environment should be given priority, even if it causes slower economic growth.

- Total Europe: 74% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- Netherlands: 71% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- Belgium: 67% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- Germany: 64% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- Austria: 70% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- United Kingdom: 71% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- Poland: 60% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- Czech Republic: 71% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- France: 71% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- Italy: 67% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- Spain: 60% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- Turkey: 71% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- USA: 60% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know
- Australia: 60% Agree, 25% Neither agree/disagree, 11% Disagree, 5% I don’t know

Agree: Protecting the environment should be given priority, even if it causes slower economic growth.

Sample size: 13,146
Extended Producer Responsibility: current practices vs EPR framework

Source: Clean Water Action
Uptake of EPR Policies

Figure 1. Cumulative EPR policy adoption globally, 1970-2015

Source: OECD (2013), What have we learned about extended producer responsibility in the past decade? - A survey of the recent EPR economic literature, Paris.
Current Research and Outreach in a Circular Economy: Domicology

- Domicology is the study of structural lifecycles.
  - Domicology recognizes that structures have a life cycle
  - Plan, design, construct, and deconstruct
    - Maximize reuse of materials
  - Identify tools, models, policies, and practices that can encourage structural life cycle
  - Research on technical, economic, and policy challenges
  - Create jobs for vulnerable people and encourage business in distressed areas
CURRENT PROJECTS:
Materials Salvage and Reuse Business Innovation Hub

The Domicology team at MSU with the support of the Michigan Department of Environment, Great Lakes & Energy (EGLE).

The project has two primary objectives:

- Conduct pioneering research on value added reuses of salvaged wood (organic) products present in abandoned structures.
- Create a statewide salvage/reuse business accelerator that will provide strategic training, technical assistance and networking to improve the viability of this nascent industry sector and expand businesses’ recycling markets for salvaged materials.
Material Salvage and Reuse Innovation HUB:

1. Surveying businesses in the structural materials salvage and reuse sector to identify training and technical assistance opportunities and challenges
   a) https://msu.co1.qualtrics.com/jfe/form/SV_2r6InuY0OqqA6B7

2. Conduct Training and Technical Assistance
   a) Topical training sessions and webinars on relevant topics (marketing, inventory control, workforce training/recruitment/retention)
   b) Technical Assistance Network (developing web-based platform to intake requests for services and support from businesses/stakeholder groups)

3. Student-lead, Faculty Guided Projects
   a) Matching industry partners with Higher ed. student teams to investigate specific research questions
      • For example, possible reuses of roof shingles
      • Local government ordinances that strengthen the salvage and reuse sector

Materials Salvage and Reuse Continuum

- Deconstruction & Demolition
- Metal
- Shingles
- Drywall/Gypsum
- Wood
- Antique Stores
- Retail Arch. Salvage
- Glass
- Vinyl/Plastics/PVC Flooring
- Brick/Gravel/Concrete
- Sorting
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