Towards a Circular Revolution

10 April 2024
John Curtin Gallery

Associate Professor Atiq Zaman

School of Design and the Built Environment
Curtin University Sustainability Policy (CUSP) Institute
Email: atiq.zaman@curtin.edu.au

Curtin University

Sustainable Communities and Waste
National Environmental Science Program

Sustainable Built Environment National Research Centre AUSTRALIA

UNITED NATIONS UNCTAD

Global South Nexus

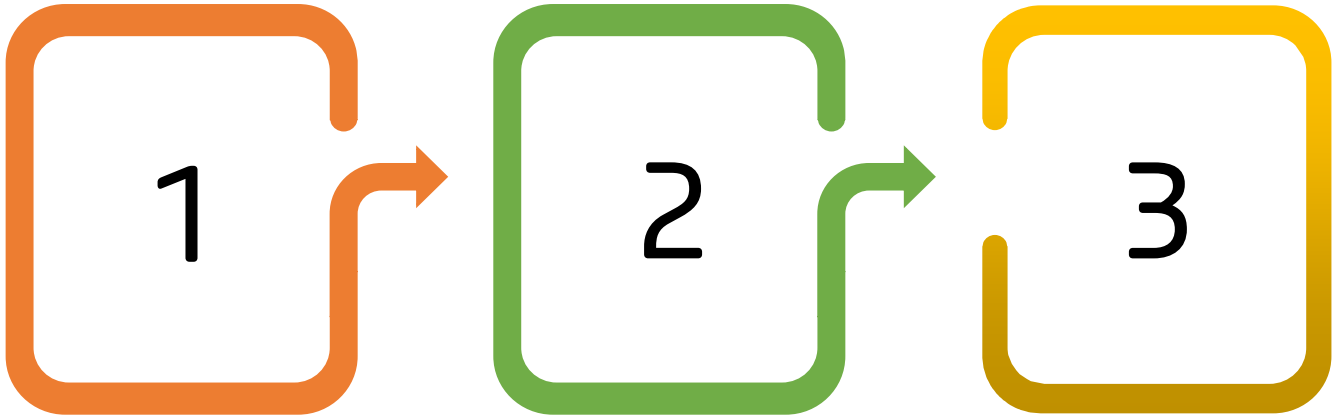
Acknowledgement of Country

I want to acknowledge Whadjuk Noongar people whose land we are standing on and recognise the strength, resilience and capacity of Noongar people.

I pay my respects to the vibrant, endless culture and the leadership of Noongar Elders past, present and future.

I respectfully acknowledge that this country (boodja) has belonged to Whadjuk Noongar people for tens of thousands of years and is a place of learning for all people now.

Presentation Outline

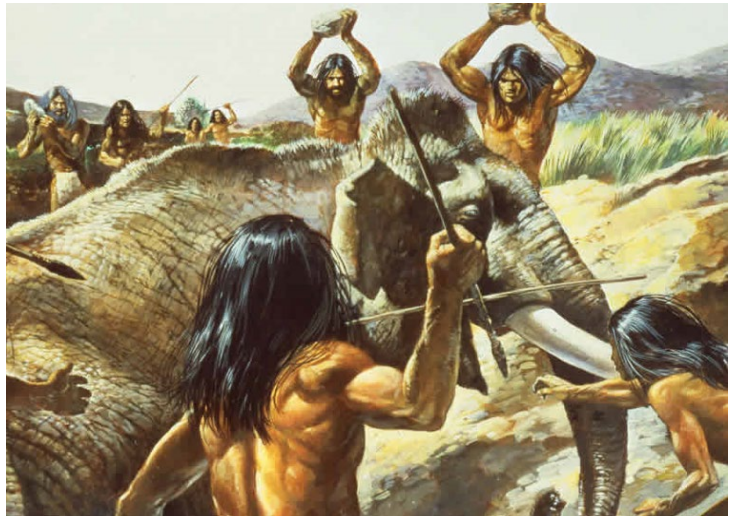


Global Waste Issues
Understanding waste issues from its core

Circular Economy/ Zero Waste
The concept, principles and practices

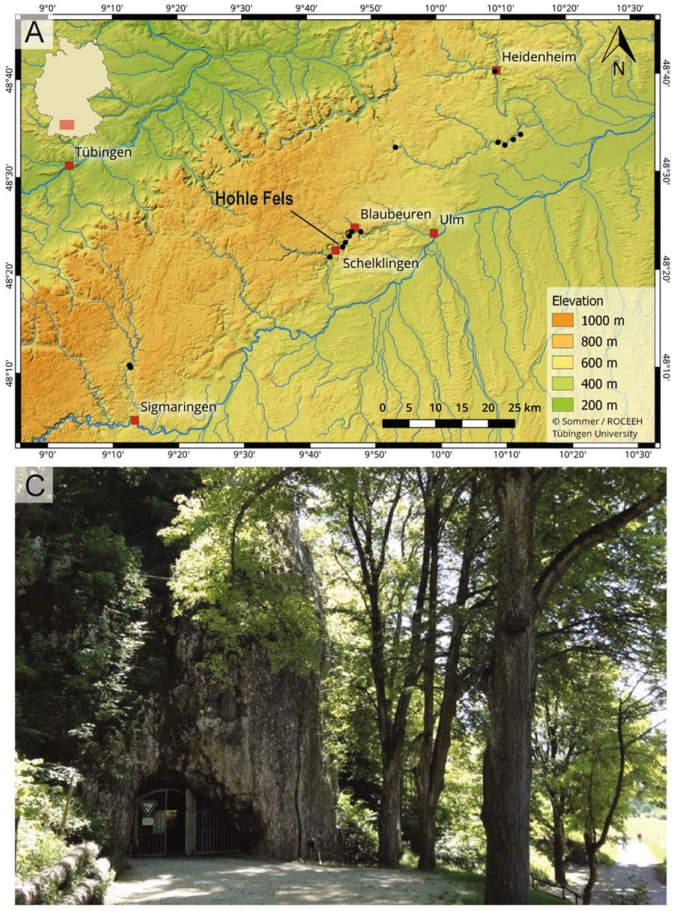
Case Study
Electric Rickshaws in Bangladesh

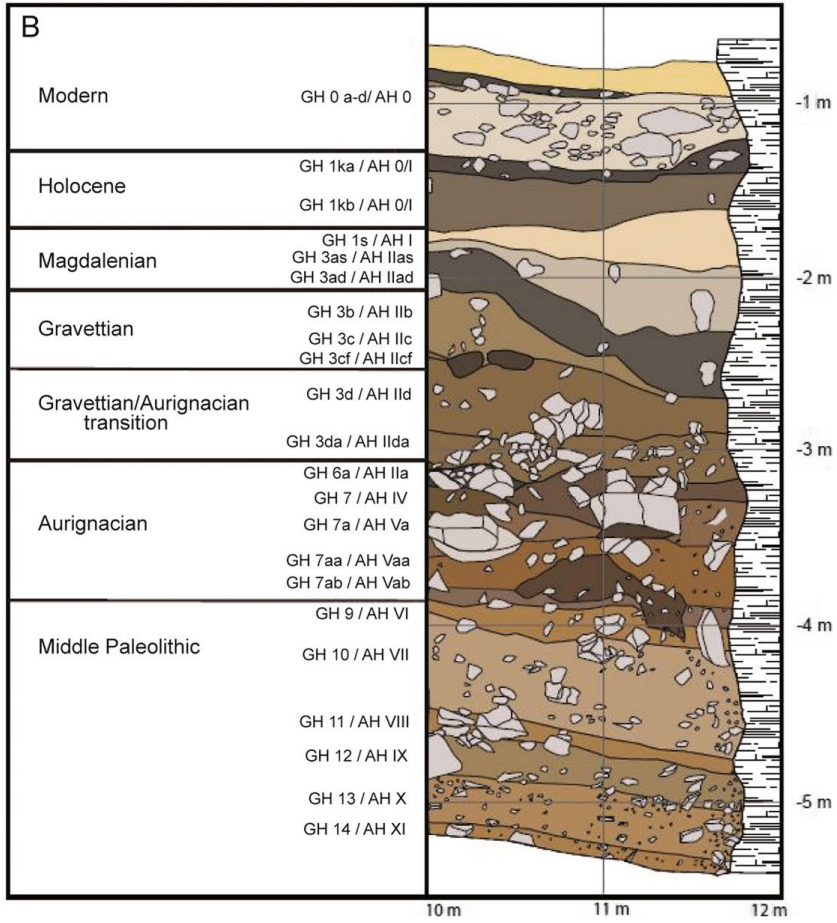
Waste in the Human History



The Illustration of Clovis people

The Illustration of Palaeolithic people



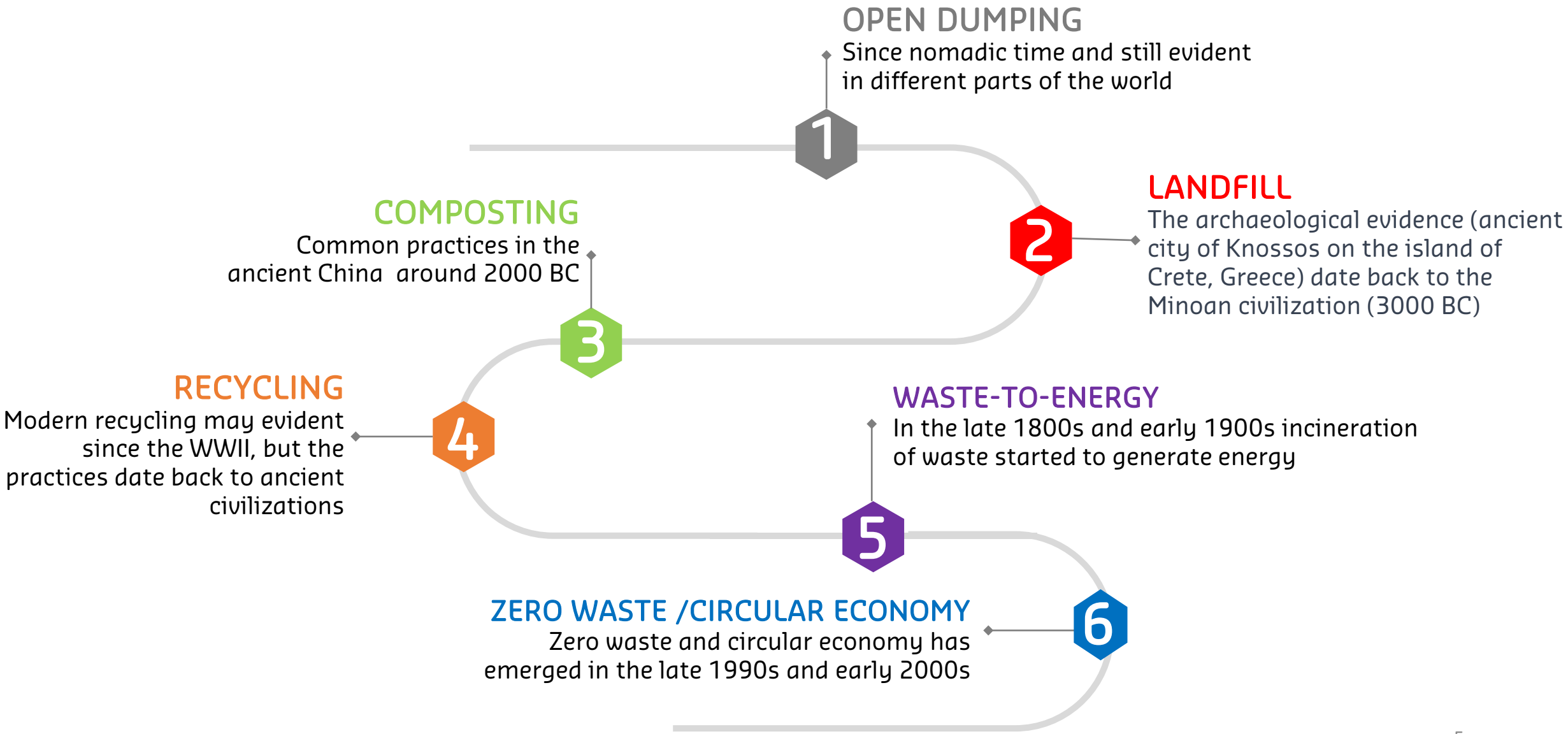


[Burning, dumping, and site use during the Middle and Upper Palaeolithic at Hohle Fels Cave, SW Germany](#) (Marcazzan, Miller & Conard, 2022)

https://www.dailymail.co.uk/news/article-4304188/Extraterrestrial-object-caused-Clovis-disappearance.html

Marcazzan, D., Miller, C. E., & Conard, N. J. (2022). Burning, dumping, and site use during the Middle and Upper Palaeolithic at Hohle Fels Cave, SW Germany. Archaeological and Anthropological Sciences, 14(9), 178. https://link.springer.com/article/10.1007/s12520-022-01647-7/figures/1

Notable Waste Management Approaches



Global Waste Crisis

Increasing waste generation
The world generates 2.01 billion metric tons of MSW and predicted to be 3.4B by 2050

Severe plastic pollution
Production has increased 20-fold since 1964 and expected to double by 2040. There will be more plastic in the ocean than fish by weight by 2050

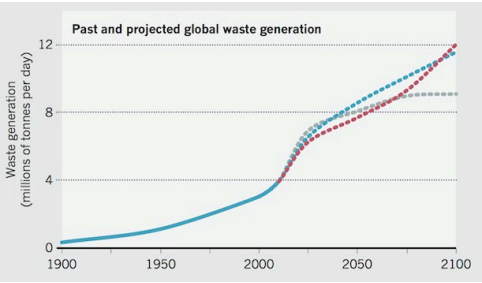
Unreported e-Waste management
53.6 million metric tons of electronic waste and is expected to reach 74.7 million metric tons by 2030. 80% of e-waste remains unreported

Global Waste Crisis

Highly depended on landfill
It manages about 85% of global waste and the 3rd largest emitter of methane after the USA and China.

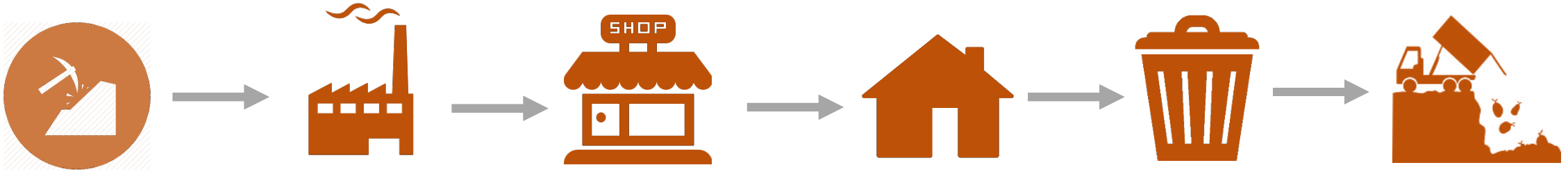
Poor recycling/circularity rate
We recycle only 15% of the collected MSW, Global circularity rate in 2023 is 7.2%,

Health & environmental impact
It costs $5.9 billion per year for health and env. damage in the L-M-I countries

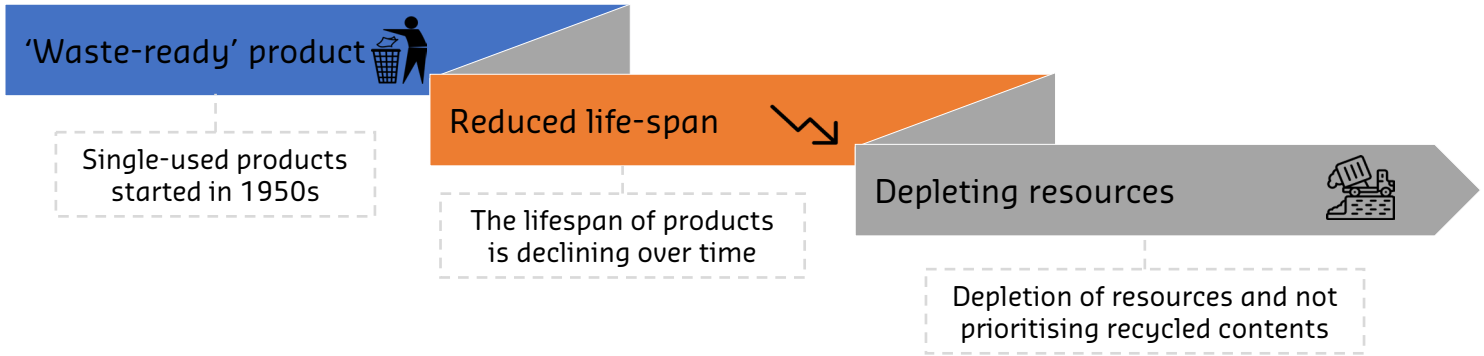


System Problems: Linear economy and linear urban metabolism

“Take-Make-Dispose” System

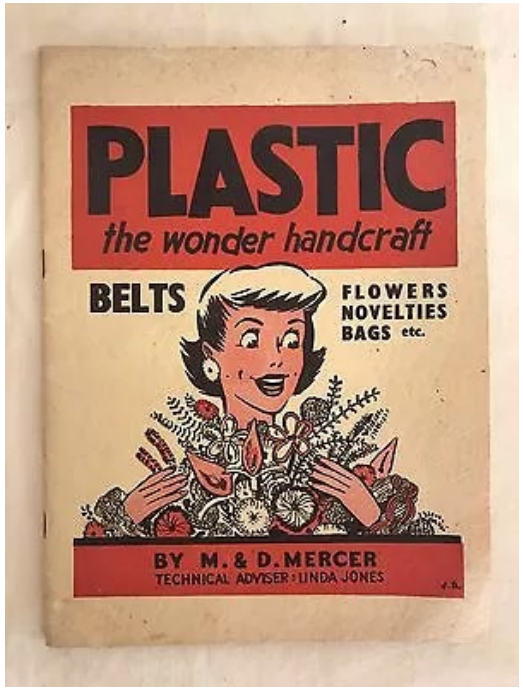


Planned Obsolescence



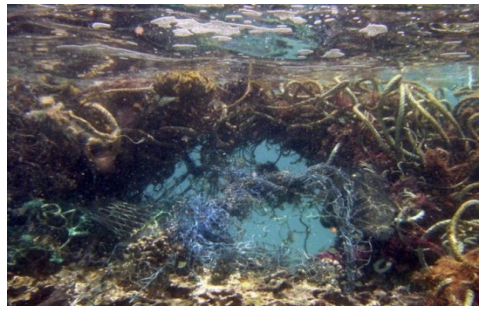
https://www.circularity-gap.world/2021
https://normative.io/insight/circular-economy/

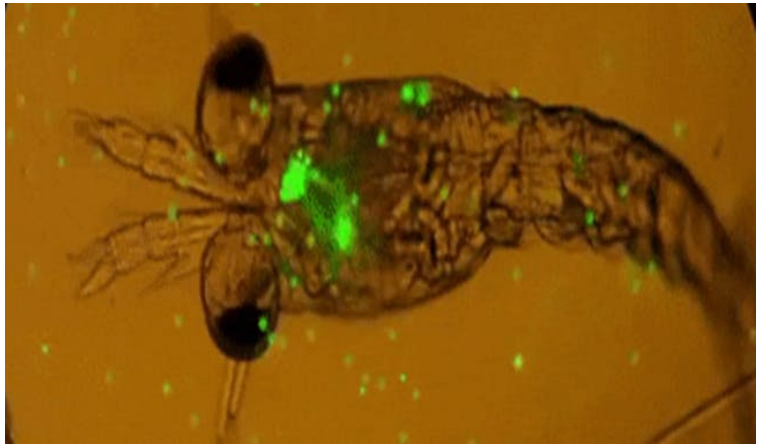
Planned obsolescence in 1950s lead to the throwaway plastic society



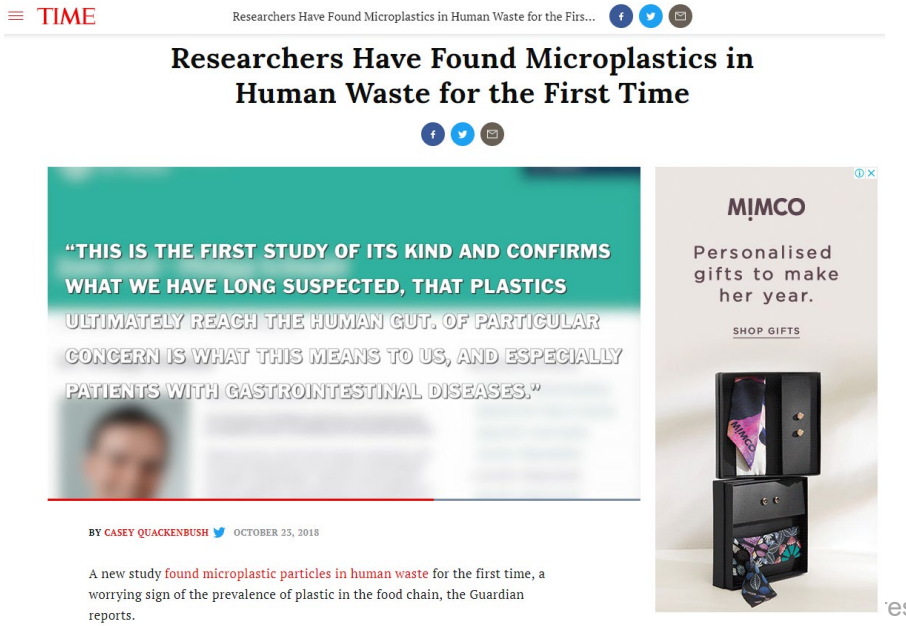
1950s

'Throwaway Living': August 1955, TIME, LIFE





Coastal Ocean Research Institute, Vancouver Aquarium Marine Science Centre, 2015



TIME Researchers Have Found Microplastics in Human Waste for the Firs...

Researchers Have Found Microplastics in Human Waste for the First Time

"THIS IS THE FIRST STUDY OF ITS KIND AND CONFIRMS WHAT WE HAVE LONG SUSPECTED, THAT PLASTICS ULTIMATELY REACH THE HUMAN GUT. OF PARTICULAR CONCERN IS WHAT THIS MEANS TO US, AND ESPECIALLY PATIENTS WITH GASTROINTESTINAL DISEASES."

BY CASEY QUACKENBUSH OCTOBER 25, 2018

A new study found microplastic particles in human waste for the first time, a worrying sign of the prevalence of plastic in the food chain, the Guardian reports.

est.com/2015/07/28/microplastic-in-marine-food-webs/
http://time.com/5431668/microplastics-human-waste-study/

Rapid shift in social value, cultural norms and priorities

	Pre-industrial era	Post-industrial era	
Scarcity-to-accessibility	Scarcity of resources: resourcefulness and frugality	Accessibility to resources	 
Needs-to-wants	Access to basic needs	Excess consumerism/ 'compulsory' consumption	 
Durability and quality	Durable and quality products	Disposable and throwaway lifestyle	 
Respect to nature	Harmony and stewardship to nature	Environmental degradation leading to environmental awareness	 

https://www.ngv.vic.gov.au/essay/global-trade-and-the-rise-of-luxury/

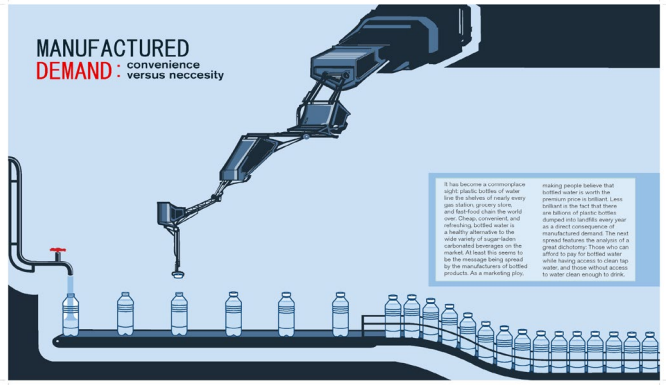
Persuade Consumerism

Advertisements

Americans are exposed to around 4,000 to 10,000 ads each day

Influence of social media

Manufactured demand

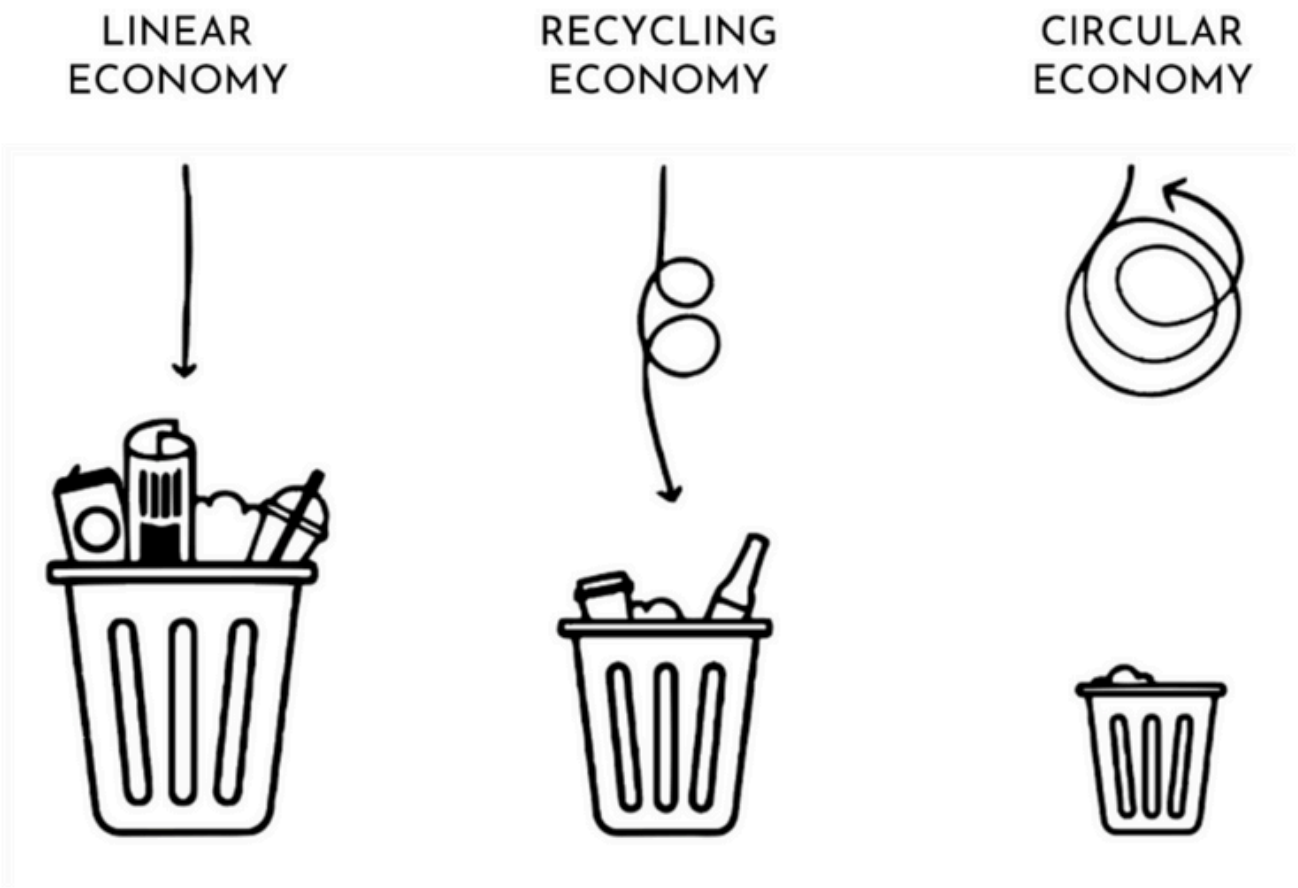


Consumerism as Identity

Shopping well-being

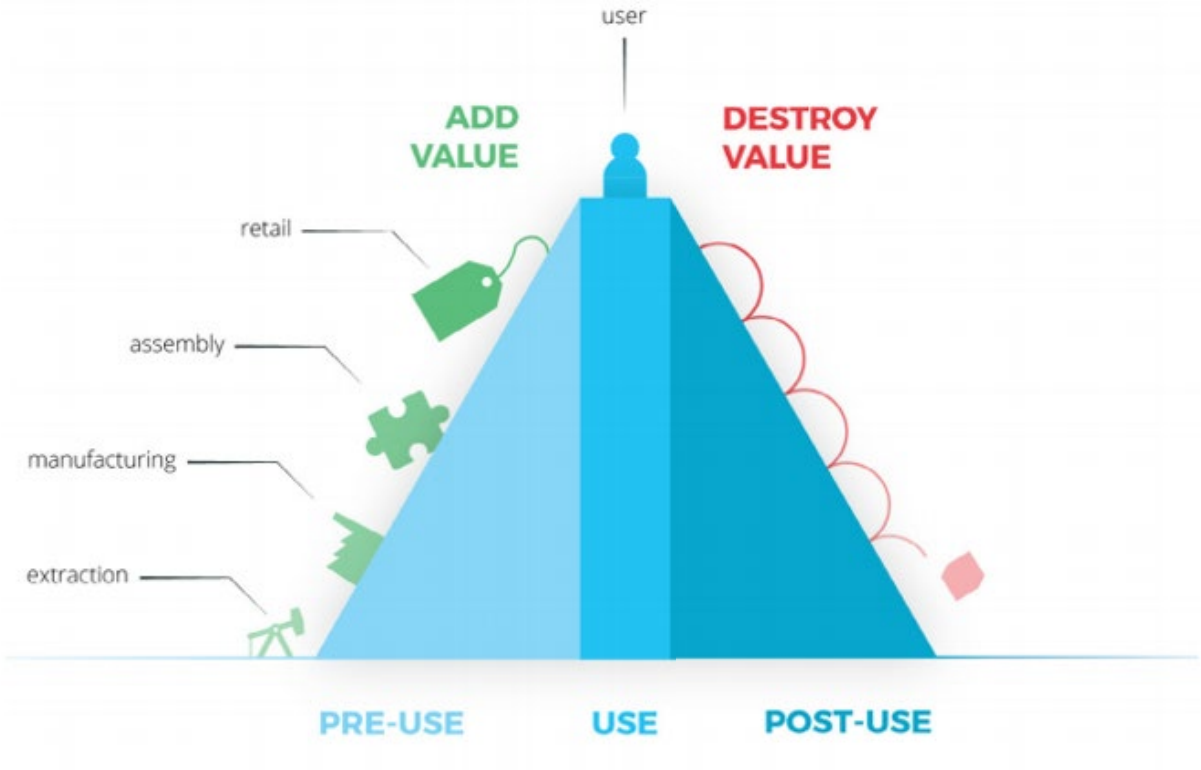
Greenwashing

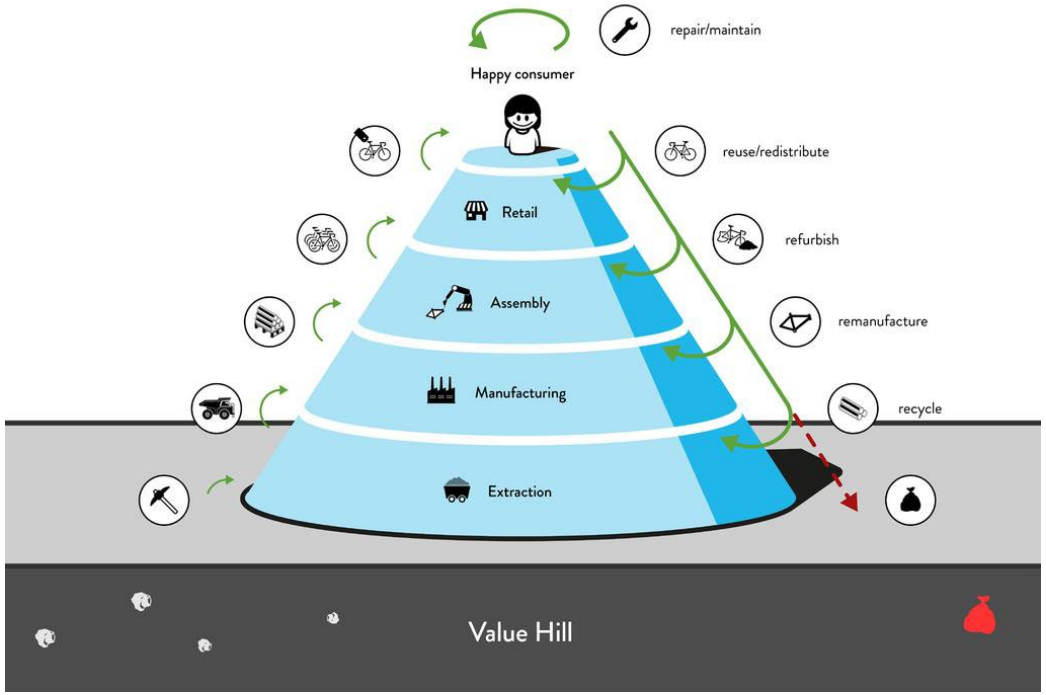
Towards a Circular Revolution



Ditlev-Simonsen, C. D. (2022). A Guide to Sustainable Corporate Responsibility: From Theory to Action (p. 274). Springer Nature.

The Value Hill Principle in a Circular Economy System

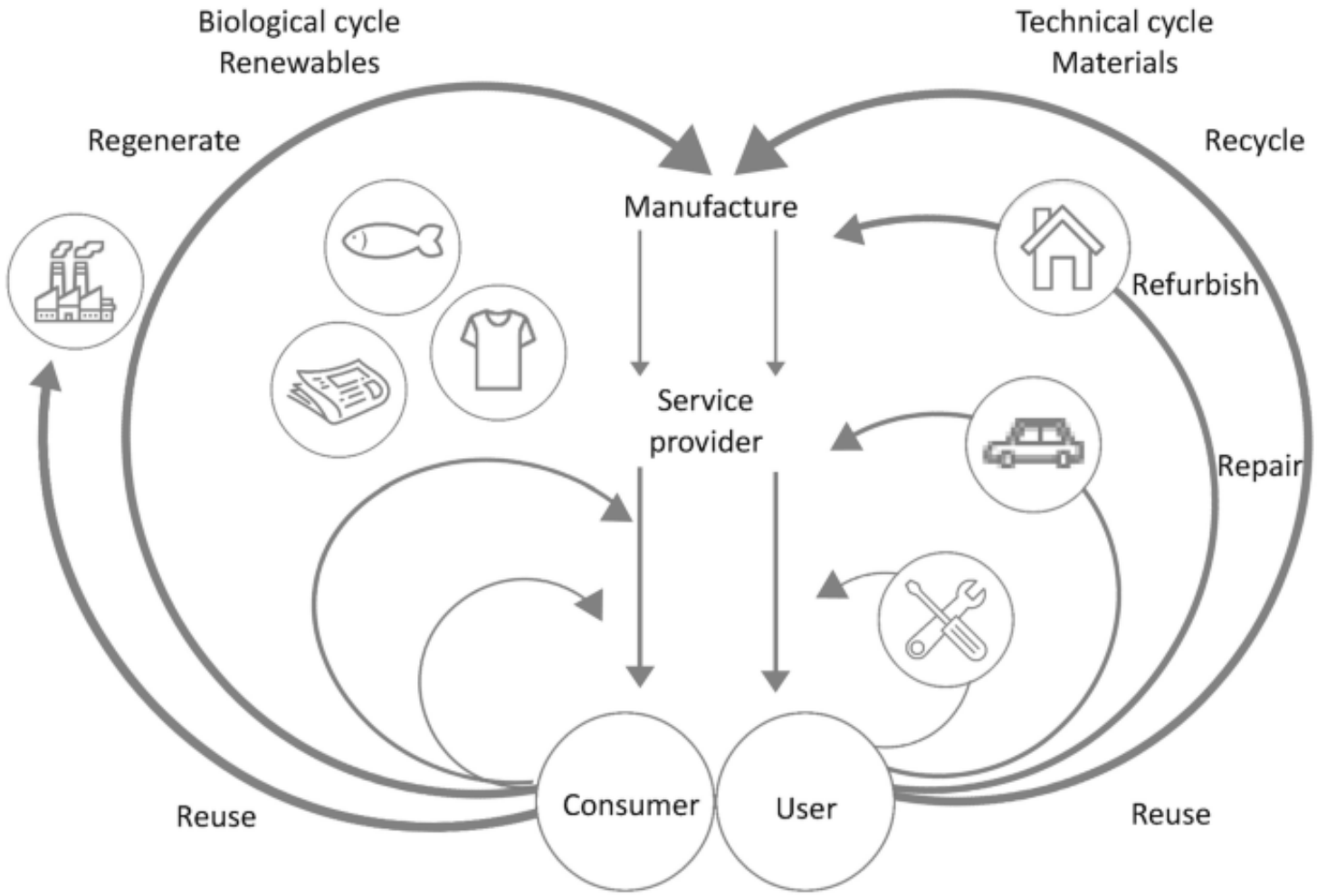




Sustainable Finance Lab, Circle Economy, Nuovalente, TUDelft, and het Groene Brein got together to create the Value Hill.

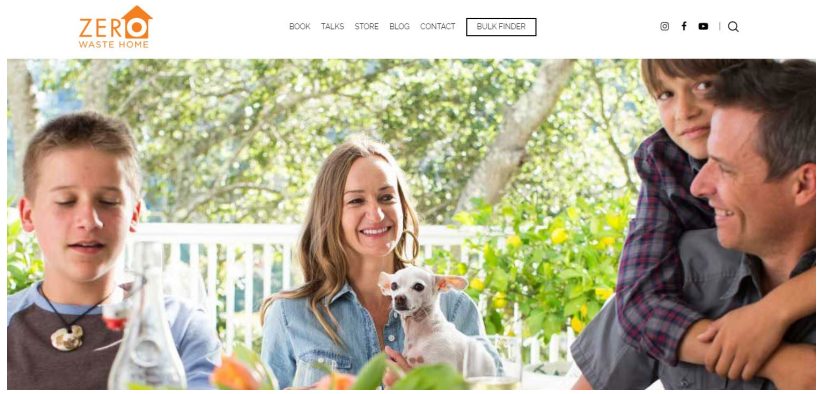
Ellen MacArthur Foundation, 2017. Circular Economy System Diagram, Ellen MacArthur Foundation: United Kingdom, available at https://www.ellenmacarthurfoundation.org/circular-economy/interactive-diagram

The Circular Economy/Zero Waste Principles



Ditlev-Simonsen, C. D. (2022). A Guide to Sustainable Corporate Responsibility: From Theory to Action (p. 274). Springer Nature.

Zero Waste Practices from Family, Community, Business, and City Scale



Unilever

adidas

IKEA

STARBUCKS COFFEE

THE NORTH FACE

SUBARU

ZERO WASTE SA

ZERO WASTE SCOTLAND

Zero Waste Brussels

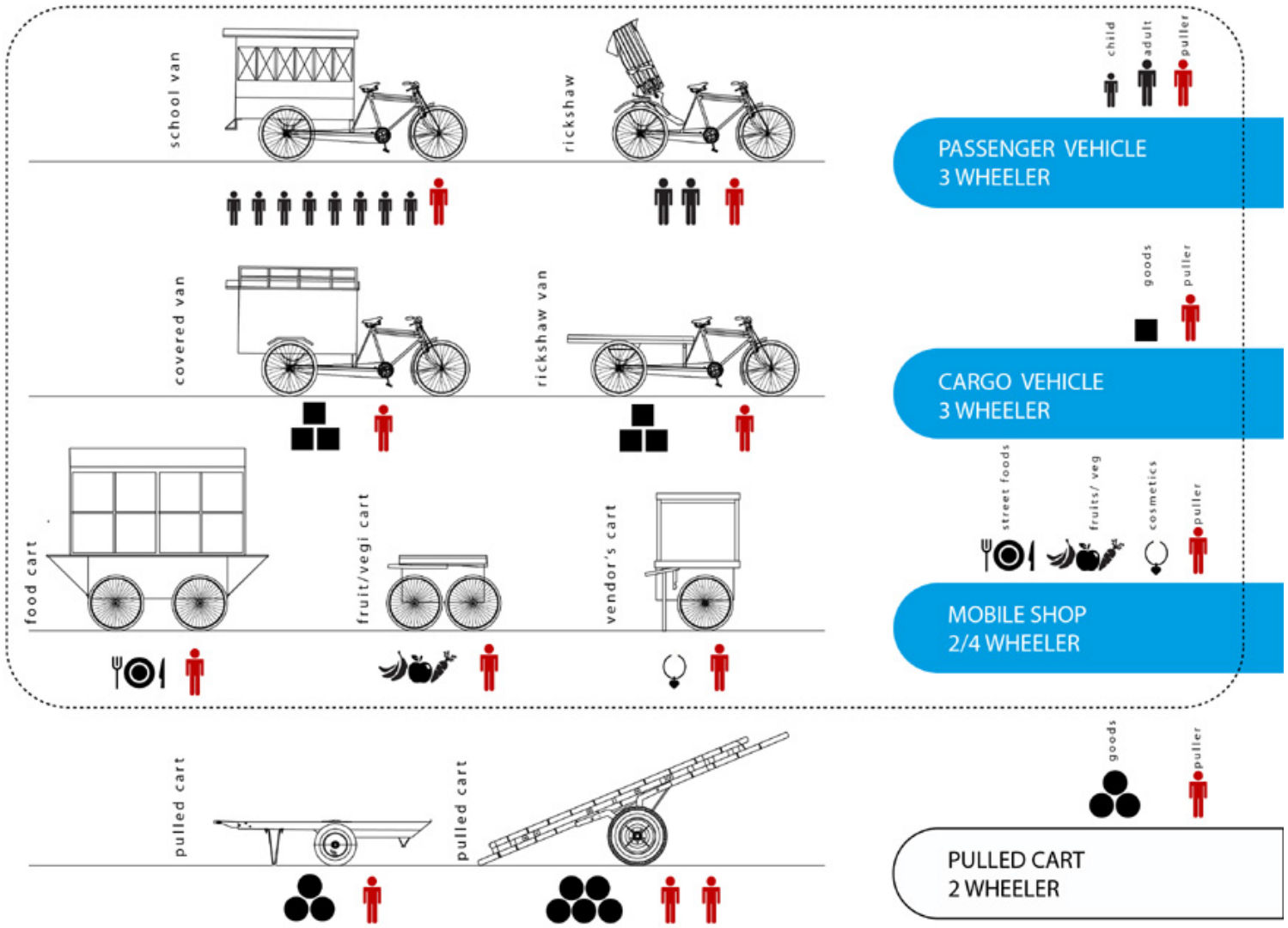
ZERO WASTE ITALY

ZERO WASTE CANADA

ZERO WASTE europe

Case Study : Electric Rickshaws in Bangladesh

Electric Rickshaws (e-rickshaws) in Bangladesh



https://contextbd.com/rickshaw-revisited/#:~:text=In%20Bangladesh%2C%20the%20first%20rickshaw,was%20limited%20to%2037%20only.
https://auto.economictimes.indiatimes.com/news/aftermarket/legalising-bangladesh-easy-bike-taxis-could-drive-safer-greener-industry/91200980

The Roles of E-rickshaws in Bangladesh

The Daily Star

Sports Business Entertainment Life & Living Youth Tech & Startup Multim

'Tesla of Bangla': Nasrul Hamid defends battery-run three-wheelers

State Minister for Power, Energy and Mineral Resources Nasrul Hamid. Star file photo

https://www.thedailystar.net/environment/natural-resources/energy/news/tesla-bangla-nasrul-hamid-defends-battery-run-three-wheelers-3539466
https://thefinancialexpress.com.bd/views/columns/impact-of-ban-on-battery-run-rickshaws-in-districts-1643812426

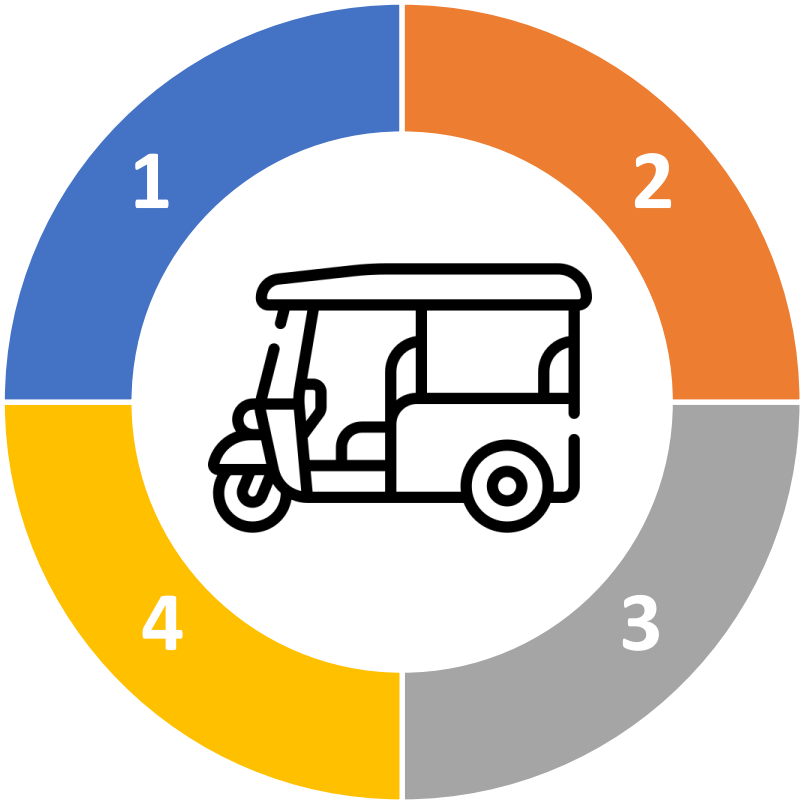
The Roles of E-rickshaws in Bangladesh

1. Socio-Economy

- Employments (3-4 million vehicles)
- Around US $1B LAB industry
- Informal recycling industry and employment opportunities
- Cost-effective transport solution
- Decongestion and rural connectivity

2. Technology

- Electric-mobility
- Diversification in transportation
- Technical capacity/skills (e-mobility)



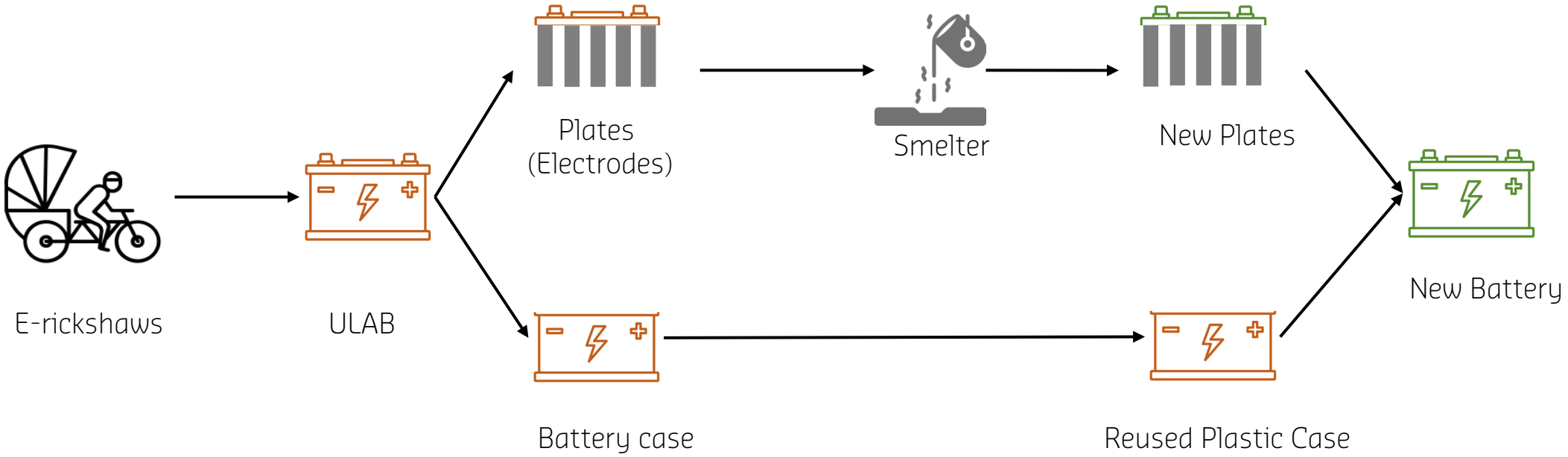
3. Environmental Aspects

- Recycling of almost 100% of ULABs (30% formal and 70% informal) with 70% efficiency
- Reduce noise pollution
- Potential for net-zero transport
- High recycling practices and potential for a circular system

4. Government/Strategic

- Reduced dependency on fossil
- National carbon emission reduction
- National electric vehicle targets (50% by 2050)
- Local industry and capacity building

The Supply Chain of Used-Lead-Acid Batteries(ULABs) in Bangladesh



Challenges of E-rickshaws in Bangladesh

Technical Challenges of the Informal ULABs Recycling

- The typical life of the batteries is between 8 and 11 months
- Corresponds to 12-16 k miles during the battery lifetime (assuming average mileage of 80km/day)
- Lack of conformance quality and prevalence of counterfeits
- Misinformation on product performance in the market
- Inflated mileage, Amp-hr, and durability promises

TESLA

A Bit About Batteries

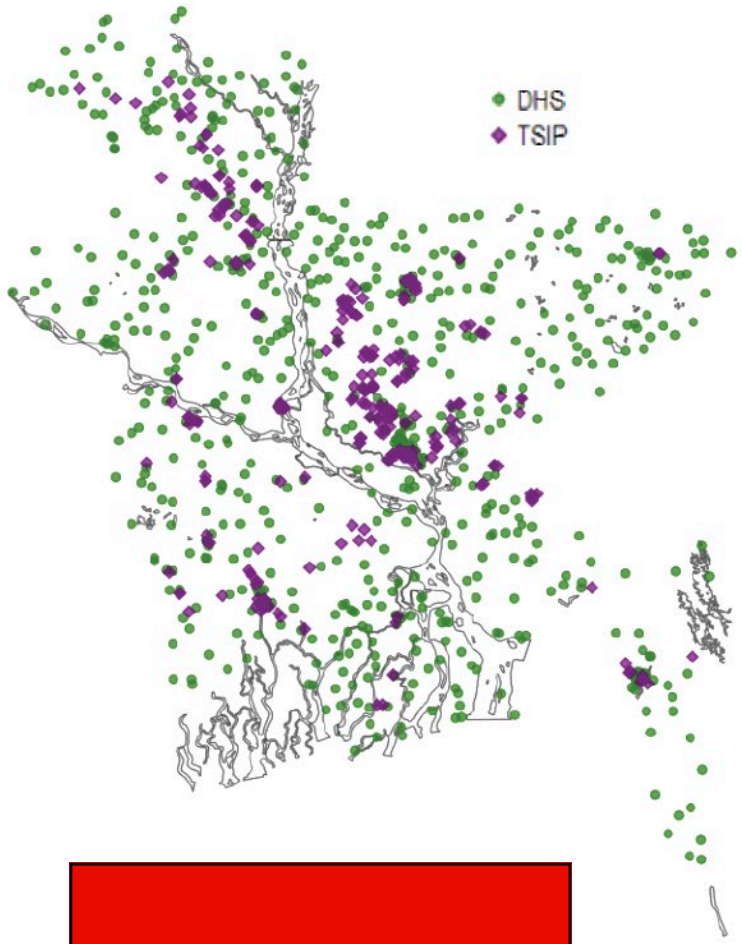
Martin Eberhard • November 30, 2006

Blog Videos Press Customer Stories

If, for example, you drive 10,000 miles per year at the end of five years you will have around 70 percent of the energy storage capacity of when new. This performance gives

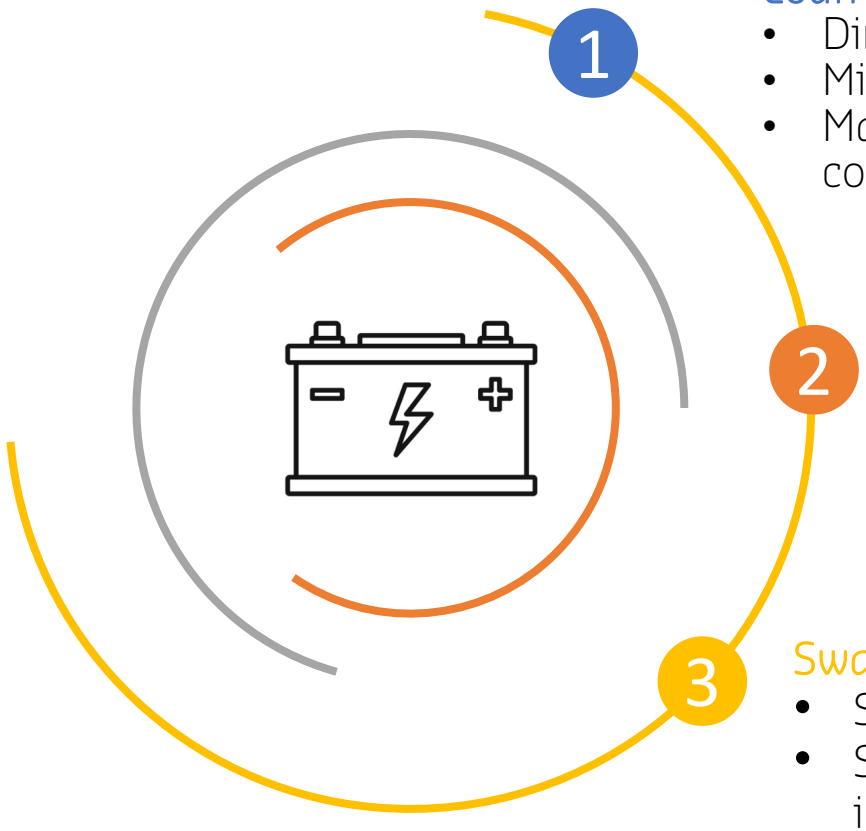
<u>The most economically vulnerable are paying a high price for electric vehicle use!</u>

Env. and Health Challenges of the Informal ULABs Recycling



- Two in Three Children in Bangladesh have high Blood Lead Levels (Pure Earth and UNICEF, 2020)
- The study done by Stanford University and George Town University, USA, found 6 percentage point increase in terminated pregnancies in households within 5 km of ULAB smelting facilities identified by Pure Earth, after implementing a high battery import tax in 2015
- 20% of the country's population lives within 5km of a ULAB smelting site.
- Lead is a potent neurotoxin – that leads to loss of IQ, education and income ability in children and cardiovascular, renal and reproductive issues in adults.

Circular Revolution in the E-rickshaws Sector in Bangladesh



Loan for Manufacturers from MFI

- Direct sales to the e-rickshaws owners
- Micro-finance loan to ensure quality and reduce counterfeits
- Maintenance training to increase battery life and reduce warranty costs

Lease from Manufacturers and loan through Banks/MFI

- Lease (long term rental) from manufacturer (financed through Bank or MFI) – company retains ownership at end-of-life
- Buyback guarantee – no replacement warranty, but prorated warranty for a longer time – customer retains ownership at end-of-life

Swap system

- Swap (short-term rental) from manufacturers
- Swap stations part of public infrastructure or bought and operated by individuals
- Financed through Bank or MFI

UK International Development
Partnership | Progress | Prosperity

UNITED NATIONS
UNCTAD

PURE EARTH
BANGLADESH

GEORGETOWN UNIVERSITY
McDonough School of Business

STANFORD BUSINESS
GRADUATE SCHOOL OF

Relevant Stakeholders

4. Regulatory bodies

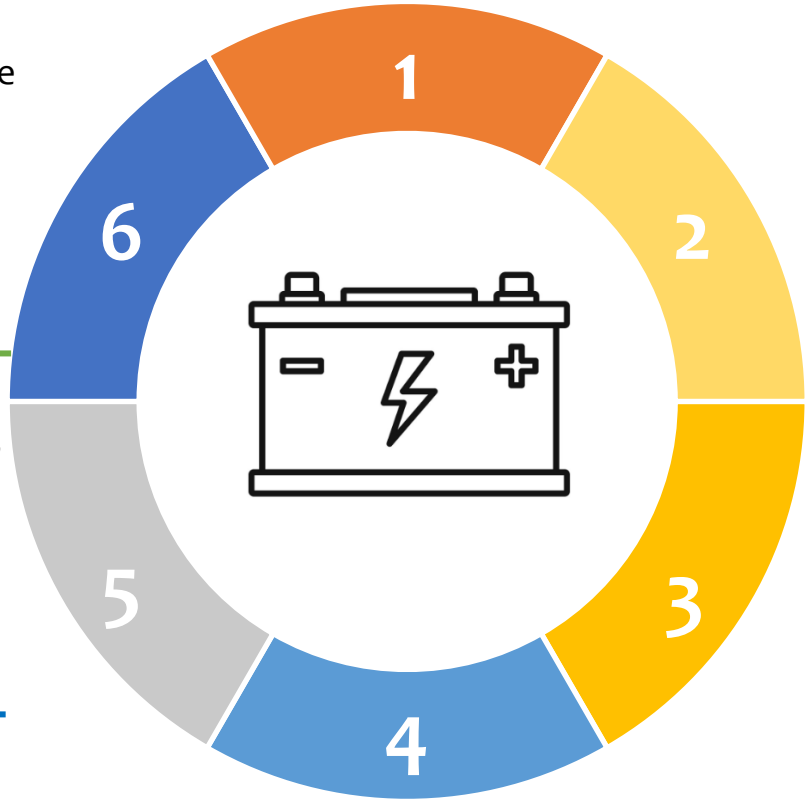
Department of Environment.
Ministry of Environment, Forest and Climate Change
Bangladesh Road Transport Authority

5. Funding bodies

Local banks and financial institutes
International funding bodies (ADB, AIIB, JICA, WB, etc.)
PPP-Public Private Partnerships

6. Communities and NGOs

Affected or Concerned communities and non-governmental organisations (NGOs)



1. Manufacturers/retailers

Formal manufacturers and retailers
Informal manufacturers and retailers

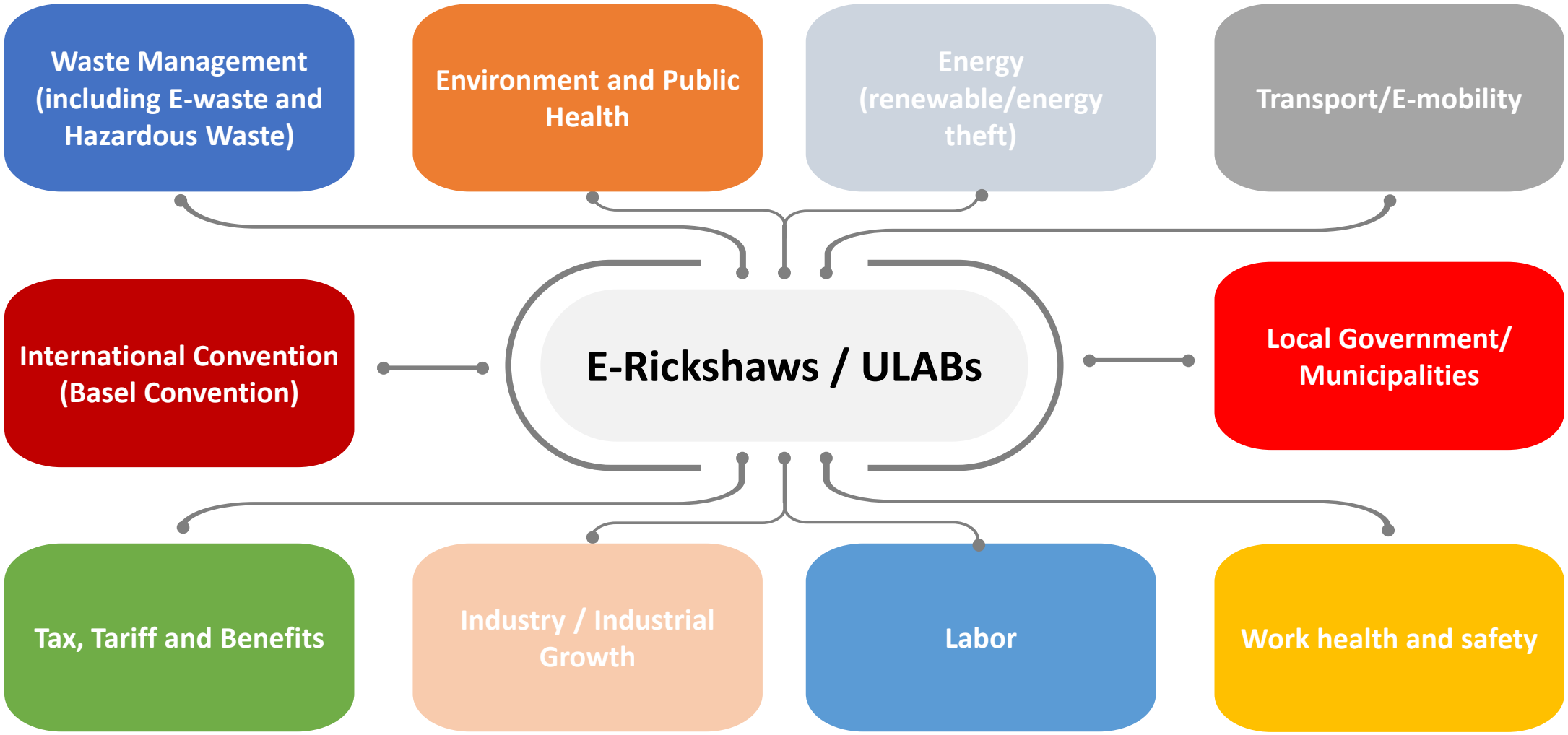
ULABs waste generators

E-rickshaw and automotive industry
Telecommunication and ICT industry
Microgrids/Integrated Power System (IPS)

3. Recyclers/smelters

Formal recyclers and smelters
Informal recyclers and smelters

Relevant Regulatory Policy Areas



Relevant Regulatory Laws/Policies/Guidelines

Regulatory Structure

Law/Acts

- Bangladesh Environment Conservation Act,1995
- Bangladesh Environment Court 2010
- National Environment Policy 2018

Rules

- Environment conservation rules 2023
- Solid Waste Management Rules 2021
- E-waste Rules 2021

Guidelines

- Guidelines for the Env Risk Assessment
- EIA Guidelines for Industries

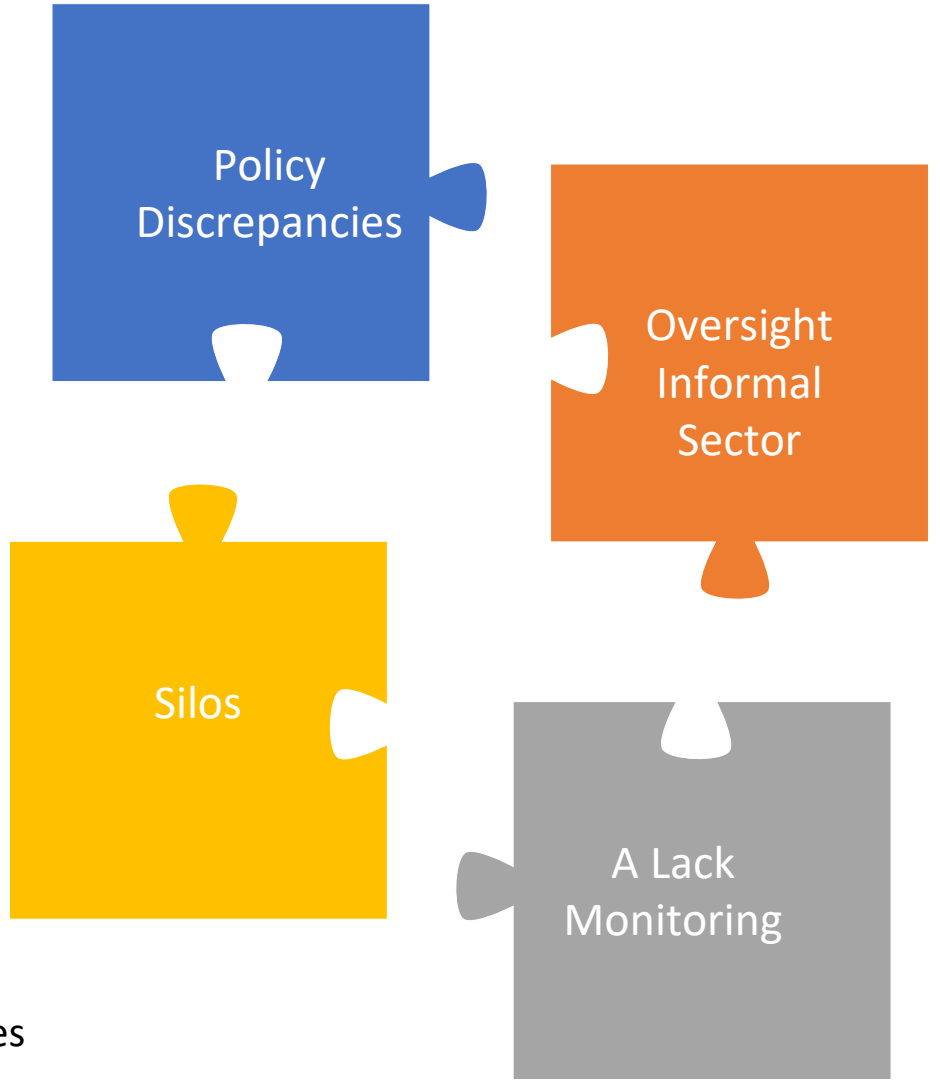
Govt Order/ Circular

- Lead Acid Battery Circular 2021
- Lead Acid Battery Reprocessing Circular 2006
- Hazardous (e-waste) Management Circular 2021

Gaps in the Regulatory Policies

Discrepancies in policies

- Not recognise e-rickshaws in the BRTA and national EV policy
- Household batteries are listed in the national hazardous e-waste policy but not ULAB from transport
- No minimum quality and standards on efficiency and performance



Oversight of the informal sector

- The role, activities and opportunities of the informal sector are widely oversight in the current policies

A lack of harmonisation and integration

- ULABs links with multiple regulatory bodies; however, there is no harmonisation and integration amongst themselves

A lack of monitoring policy requirements

- The entire sector lacks monitoring and compliance

Key Recommendations to Minimise Policy Gaps

1. Harmonisation and Integration
Foster harmonisation and integration in existing regulatory policies related to ULAB management

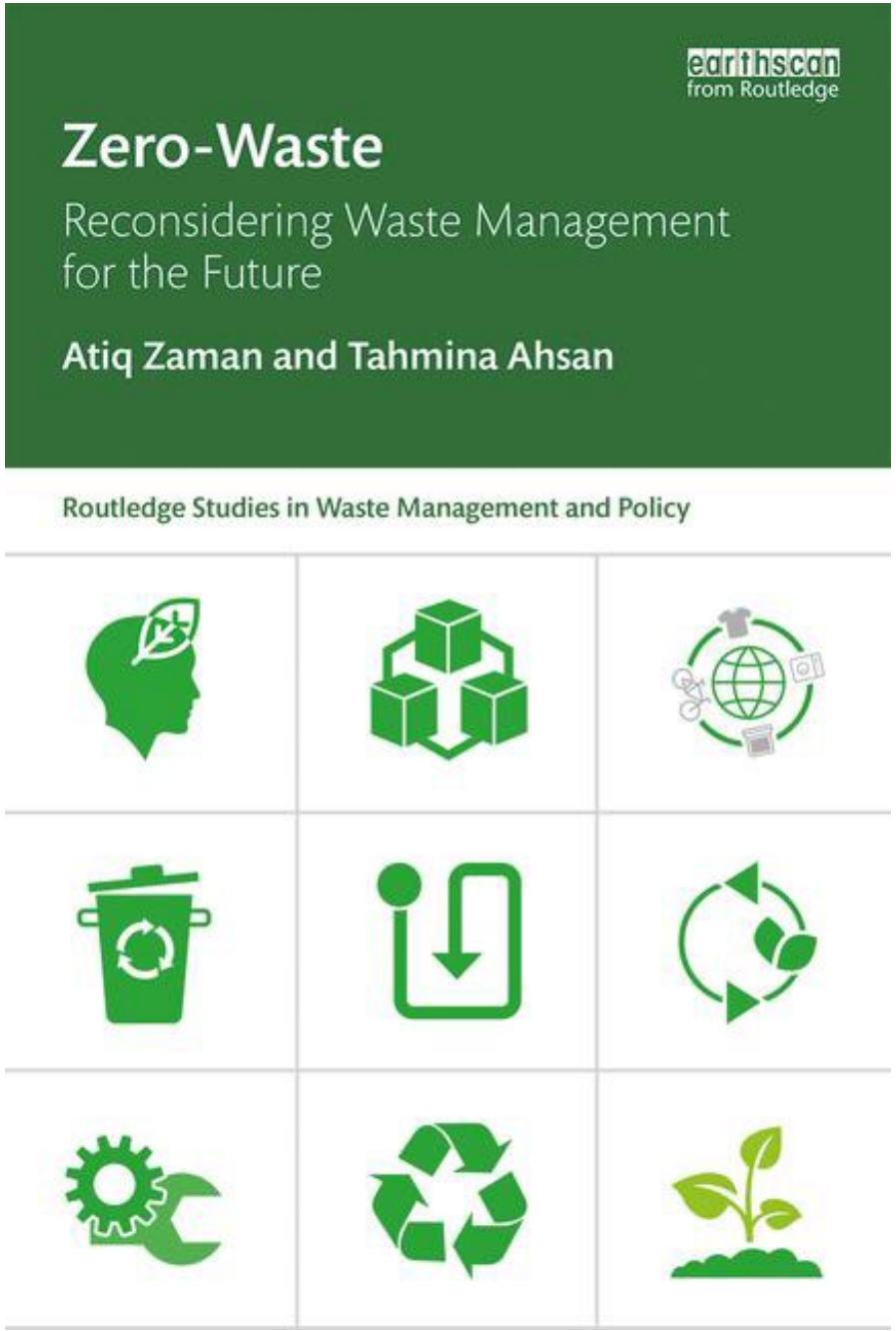
2. Recognition of e-rickshaws
Recognise e-rickshaws as part of transport solutions and thus integrate with the relevant policies (e.g. BTRA mandatory registration)

3. Enforcement and monitoring
Strengthen the enforcement and monitoring of the current relevant regulations (e.g. compliance and safety in ULABs recycling), and execute penalties and set examples for non-compliant entities

4. Consistency
Consistent and clear messaging across various stakeholders and actors involved with e-rickshaws

5. Prohibit child labour
Prohibit the involvement of children labour and vulnerable women and informal workers' occupational safety hazards in the recycling of ULABs

6. Foster business opportunities
Foster business opportunities for both formal and informal ULAB recycling with appropriate support and incentives from government bodies



Thank you for your attention!
Any Question?

Email: atiq.zaman@curtin.edu.au
Please join via LinkedIn QR Code