Circular Economy at the World Economic Forum

The World Economic Forum is the international organization for public-private cooperation. Our mission is to improve the state of the world.

We provide a global, independent, impartial and future-oriented platform for the world’s leaders to come together to shape the future.

System Initiatives

Each System Initiative is designed to engage a multistakeholder ecosystem of the most relevant actors and experts to shape the future of:

Consumption

Digital Economy and Society

Economic Progress

Education, Gender and Work

Energy

Environment and Natural Resource Security

Financial and Monetary Systems

Food

Health and Healthcare

Information and Entertainment

International Trade and Investment

Long-Term Investing, Infrastructure and Development

Mobility

Production

WORLD ECONOMIC FORUM

Our key areas of focus and the relevance to the circular economy:

Risks and Reward

Systems Leadership

The Fourth Industrial Revolution

Why the Circular Economy

Risks and Reward

Our Only Inhabitable Planet is at Breaking Point

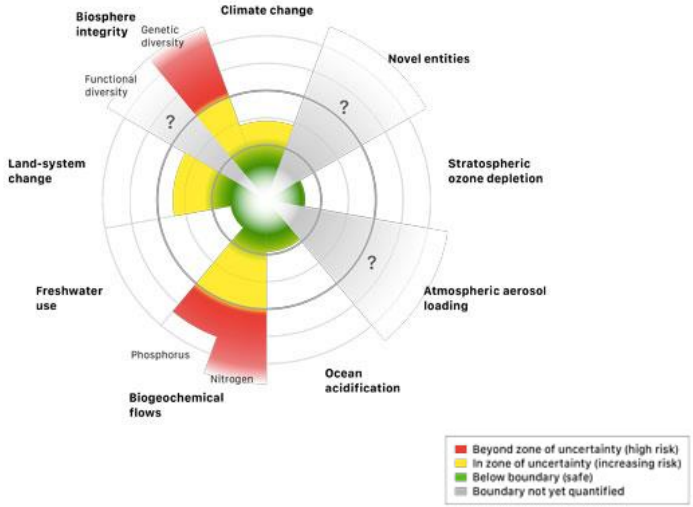
World Scientists' Warning to Humanity: A Second Notice"

(issued by 15,000 scientists from 184 countries on 13 November 2017)

"Humanity has failed to make sufficient progress in generally solving these foreseen environmental challenges, and alarmingly, most of them are getting far worse."

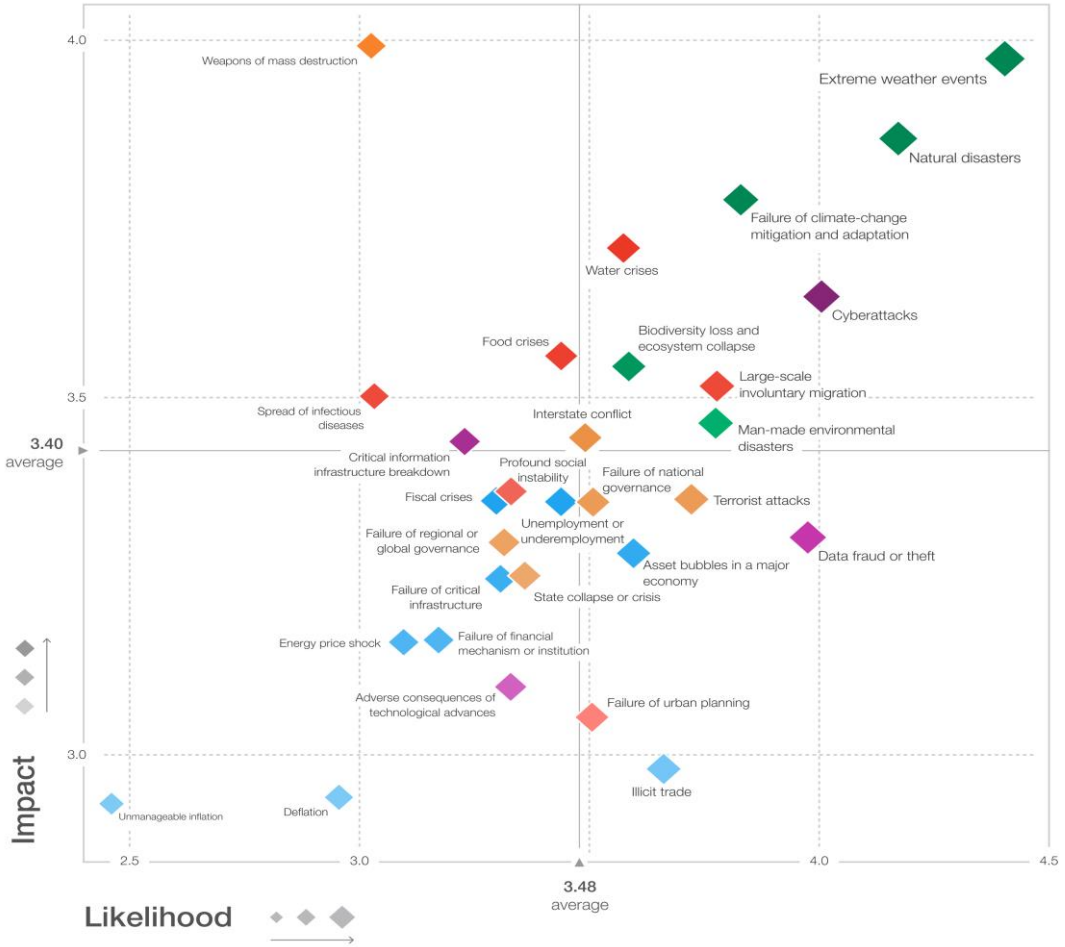
"Soon it will be too late to shift course away from our failing trajectory, and time is running out."

The Planetary System is under significant stress – we have already surpassed 4 out of 9 'planetary boundaries' defining the safe operating space for humans

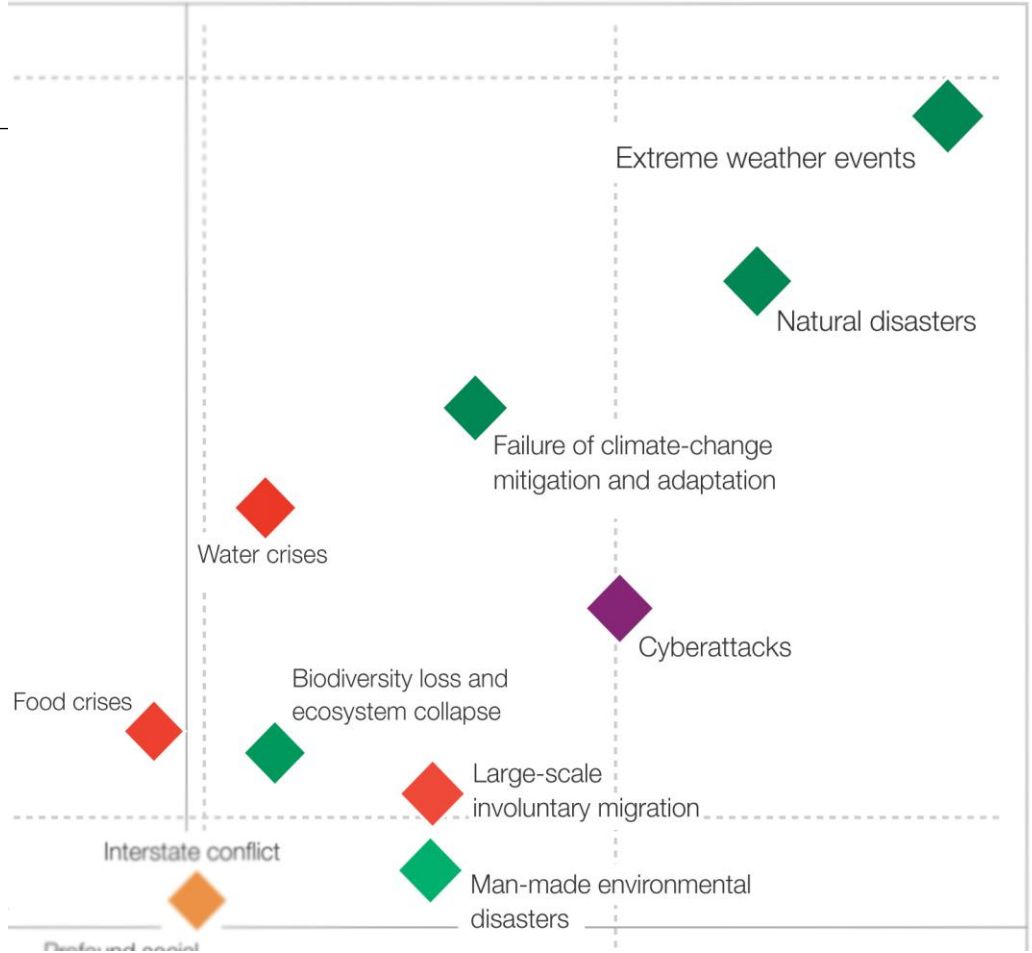


Source: Stockholm Resilience Centre

Global Risk Landscape 2018



Global Risk Landscape 2018: top right hand quadrant



Top 5 Global Risks in Terms of Likelihood

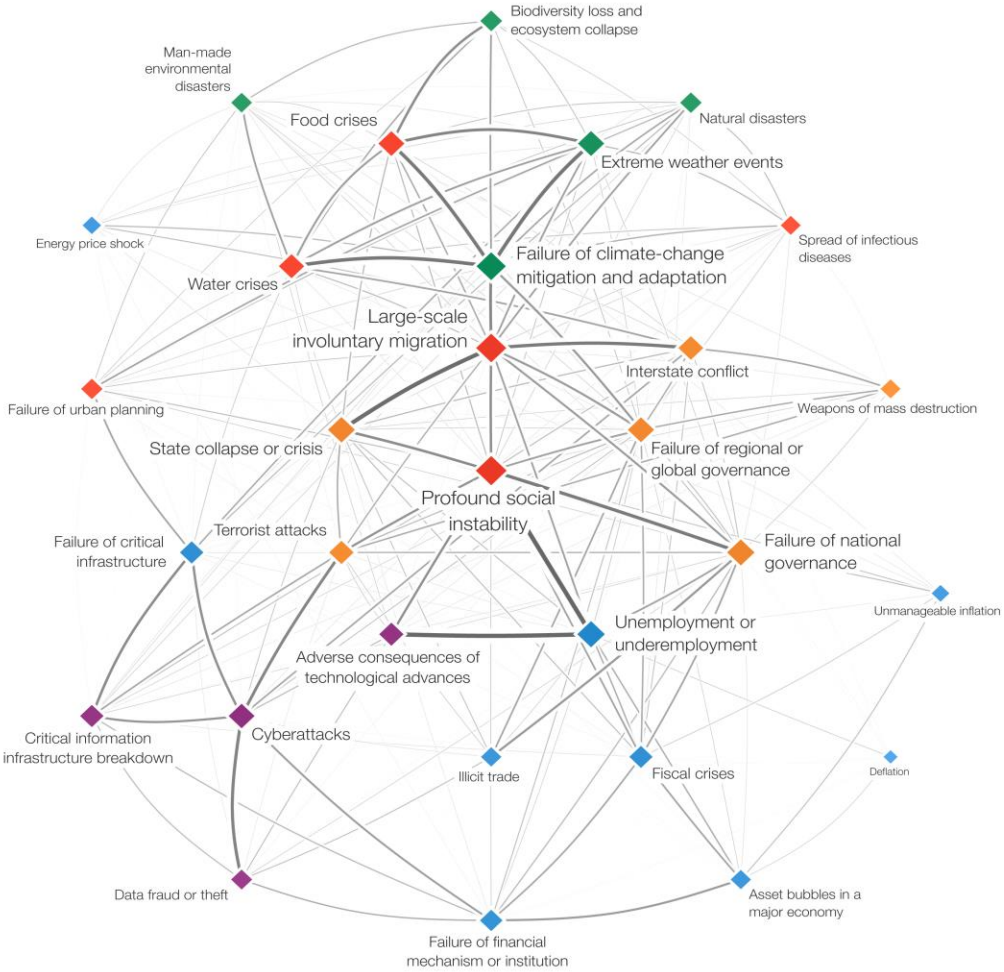
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1st	Asset price collapse	Asset price collapse	Asset price collapse	Storms and cyclones	Severe income disparity	Severe income disparity	Income disparity	Interstate conflict with regional consequences	Large-scale involuntary migration	Extreme weather events	Extreme weather events
2nd	Middle East instability	Slowing Chinese economy (<6%)	Slowing Chinese economy (<6%)	Flooding	Chronic fiscal imbalances	Chronic fiscal imbalances	Extreme weather events	Extreme weather events	Extreme weather events	Large-scale involuntary migration	Natural disasters
3rd	Failed and failing states	Chronic disease	Chronic disease	Corruption	Rising greenhouse gas emissions	Rising greenhouse gas emissions	Unemployment and underemployment	Failure of national governance	Failure of climate-change mitigation and adaptation	Major natural disasters	Cyberattacks
4th	Oil and gas price spike	Global governance gaps	Fiscal crises	Biodiversity loss	Cyber attacks	Water supply crises	Climate change	State collapse or crisis	Interstate conflict with regional consequences	Large-scale terrorist attacks	Data fraud or theft
5th	Chronic disease, developed world	Retrenchment from globalization (emerging)	Global governance gaps	Climate change	Water supply crises	Mismanagement of population ageing	Cyber attacks	High structural unemployment or underemployment	Major natural catastrophes	Massive incident of data fraud/theft	Failure of climate-change mitigation and adaptation

Top 5 Global Risks in Terms of Impact

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1st	Asset price collapse	Asset price collapse	Asset price collapse	Fiscal crises	Major systemic financial failure	Major systemic financial failure	Fiscal crises	Water crises	Failure of climate-change mitigation and adaptation	Weapons of mass destruction	Weapons of mass destruction
2nd	Retrenchment from globalization (developed)	Retrenchment from globalization (developed)	Retrenchment from globalization (developed)	Climate change	Water supply crises	Water supply crises	Climate change	Rapid and massive spread of infectious diseases	Weapons of mass destruction	Extreme weather events	Extreme weather events
3rd	Slowing Chinese economy (<6%)	Oil and gas price spike	Oil price spikes	Geopolitical conflict	Food shortage crises	Chronic fiscal imbalances	Water crises	Weapons of mass destruction	Water crises	Water crises	Natural disasters
4th	Oil and gas price spike	Chronic disease	Chronic disease	Asset price collapse	Chronic fiscal imbalances	Diffusion of weapons of mass destruction	Unemployment and underemployment	Interstate conflict with regional consequences	Large-scale involuntary migration	Major natural disasters	Failure of climate-change mitigation and adaptation

The most frequently cited risk interconnections

Top five risk interconnections	
1	• Biodiversity loss and ecosystem collapse • Food crises
2	• Extreme weather events • Failure of climate change mitigation and adaptation
3	• Water crises • Large-scale involuntary migration
4	• Interstate conflict • Profound social instability • Failure of national governance
5	• Unemployment or underemployment • Adverse consequences of technological advances

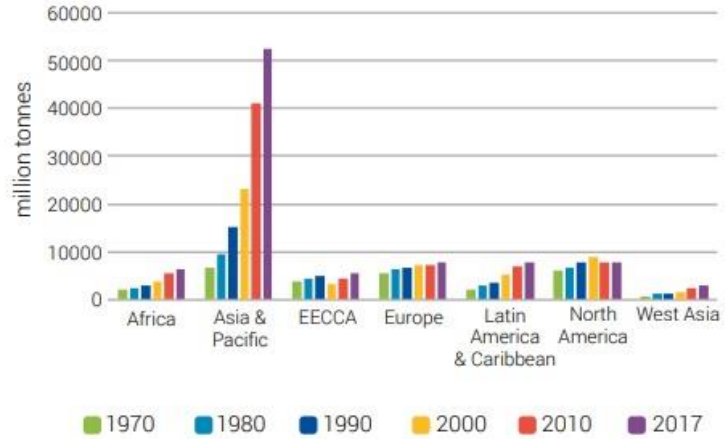


The 13 trends driving the global risk landscape

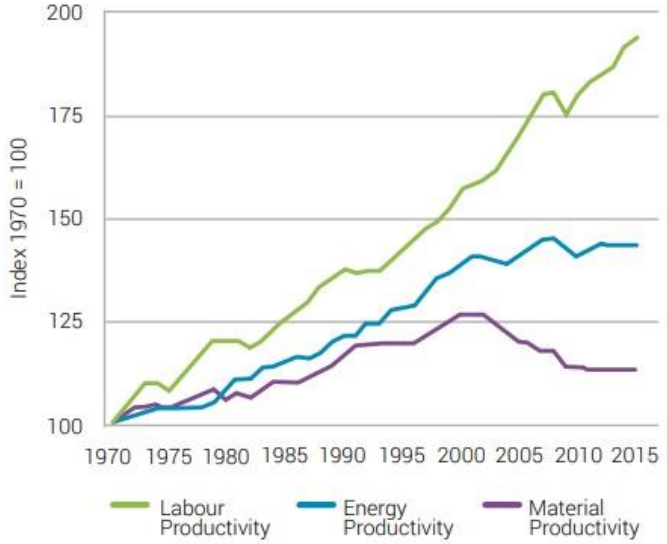
WORLD ECONOMIC FORUM

- Ageing population
- Changing landscape of international governance
- Changing climate
- Degrading environment
- Growing middle class in emerging economies
- Increasing national sentiment
- Increasing polarization of societies
- Rising chronic diseases
- Rising cyber dependency
- Rising geographic mobility
- Rising income and wealth disparity
- Rising urbanization
- Shifting power

Global trends in natural resource use



Legend: Regional aggregates represent the United Nations Environment regional classification. EECCA refers to Eastern Europe, Caucasus and Central Asia.



Natural resource use set to double by 2050 to 167 trillion tonnes
Already responsible for 50% of emissions

Source: International Resource Panel, 2016; OECD 2018

Circular economy is a powerful strategy to address some of the most presssing environmental, economic and social challenges of the 21st century

NEED FOR URGENT ACTION

During the 20th century the use of natural resources rose at about **twice the rate of population growth**[3]

We extract over 84 billion tonnes of materials per year to meet the functional needs of society. Yet, **only 9% of these materials are cycled back into our economies**[5]

Estimates suggest that by 2050, if current trends continue, there will be **more plastic than fish in the ocean**[6]

Disease caused by **pollution was responsible for more than 9 million premature deaths in 2015** – 16% of deaths worldwide or three times more deaths than from AIDS, tuberculosis, and malaria combined[7]

PROMISING SOLUTION

Circular economy provides a **$4.5 trillion opportunity** by 2030 through avoiding waste, making businesses more efficient and creating new employment opportunities[8]

Reducing or reusing just one fourth of the current amount of food waste can feed **870 million hungry people in the world**[9]

Circular Economy has been shown to almost half the number of years of anticipated **water shortages in water stressed regions of California**[10]

CE in India could lead to **82% less consumption of virgin materials** in transportation & vehicle manufacturing by 2050[11]

A ROADMAP FOR ACHIEVING SUSTAINBLE PRODUCTION & CONSUMPTION

The Circular Economy is about transforming our production and consumption approaches….

Sustainable Production and consumption

CE in India could lead to **82% less consumption of virgin materials** in transportation & vehicle manufacturing by 2050

….but given the system transformation, it will positively impact a number of other SDGs.

Zero Hunger

Reducing or reusing the present amount of food wastage can feed **870 million hungry people** in the world

Clean Energy

In the US, **community based solar power** plants are expected to provide **30GW of power by 2020**

Sustainable Cities & Communities

In CE scenario, a city could source **$ 21 billion worth of gold and silver** that goes into the electronics each year **from its own waste**

Clean Water & Sanitation

Circular Economy has been shown to almost **halve the no. of years of anticipated water shortages** in water stressed regions of California

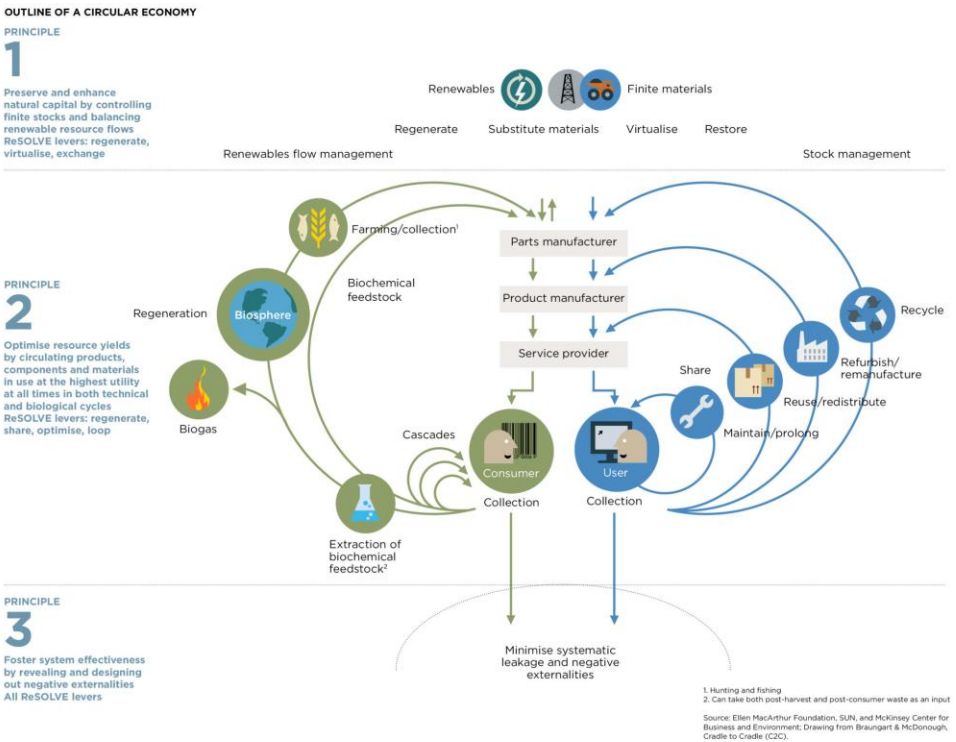
Good Jobs & Economic Growth

About **500,000 jobs are created by the recycling industry** in the EU, and this number could well rise in a CE scenario

Life Below Water

The European Commission is to adopt a **strategy on plastics** in the Circular Economy to **reduce marine litter by 30%** by 2020

The Circular Economy

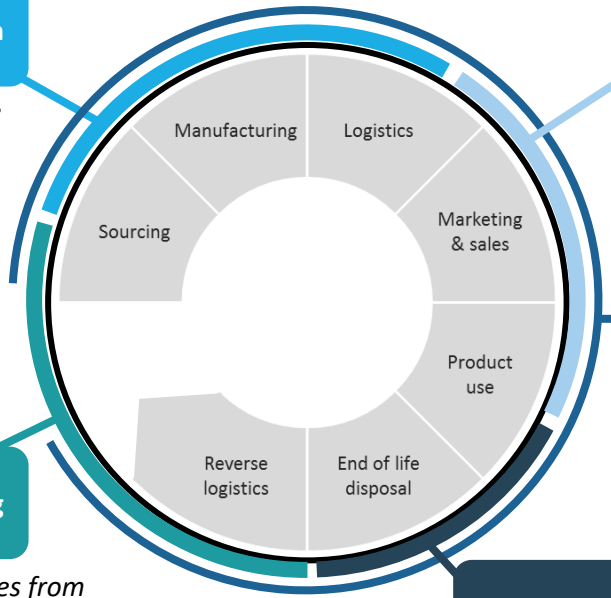


Source: Waste to Wealth, Accenture, 2015

What systems changes are required to shift this trajectory?

Circular Supply-Chain

Develop and supply renewable and/or fully recyclable input material to replace e.g. virgin synthetic fibers



Sharing Platform

Drive up utilization rate of products by making possible shared use / access / ownership

Product as a Service

Offer product access rather than ownership where supplier take responsibility for product lifecycle management

Recovery & Recycling

Recover useful resources from disposed products and put back into production through return chain, reprocessing and re/upcycling

Product Life-Extension

Extend working life of products through repairs, maintenance, second hand, donations, etc.

Source: Waste to Wealth, Accenture, 2015

Systems leadership

A special form of leadership – **system leadership** – is needed to tackle global challenges like food security, climate change, job creation, and gender parity.

Complex and systemic, **rooted in the actions and interactions** of diverse yet interconnected, interdependent stakeholders.

Cannot be addressed in a top-down, pre-planned, linear fashion; point solutions don't work. Solutions **require stakeholders to change the way they operate at the global, national, and local levels**.

System leadership can help align the efforts of diverse stakeholders in order to accelerate this process, and ensure that it delivers more sustainable, inclusive business growth and human development.

Jane Nelson and Beth Jenkins – Harvard Kennedy School

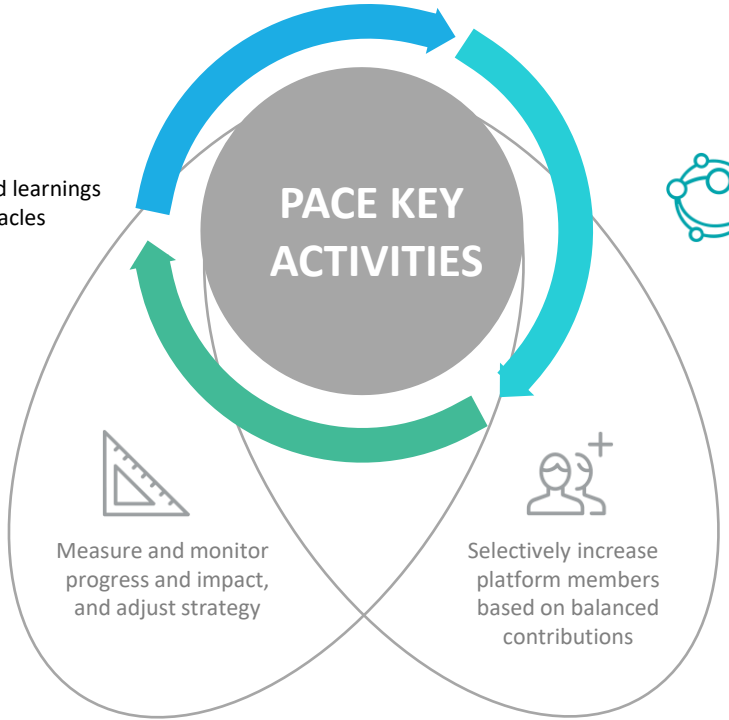
PACE advances impact on the circular economy by driving projects, leveraging leadership, and sharing learnings

Drive **PROJECTS**

- Initiate, lead and hand-over 3-4 core projects
- Lightly support projects led by affiliates:
  - Create visibility of project status, success and learnings
  - Respond to project requests to address obstacles

Leverage global **LEADERSHIP to drive action**

- Identify scale-up and replication opportunities requiring leadership action
- Help individual leaders identify their potential contribution
- Agree on individual leadership commitments
- Reach out to peers to scale through adoption of learnings
- Drive impact at scale by smartly utilizing global, regional leadership venues, e.g., G7, G20, APEC, Davos, Club of Rome, Chambers of Commerce



Capture and Disseminate **LEARNINGS** for Scaling

- Capture learnings from PACE projects and translate into replicable frameworks and approaches
- Leverage knowledge of PACE members and networks
- Disseminate learnings to relevant stakeholders to drive scale

PACE currently focuses on four key thematic areas with the aim to stimulate circular economy market transformation within these at speed and scale

ELECTRONICS

- **$55 billion of total value** in recoverable materials from e-waste is not captured
- **44.7 million metric tonnes of e-waste** is generated globally each year

PLASTICS

- **95% of global packaging material value** is lost after first use
- By 2050 there will be **more plastics than fish** in the ocean

FOOD & BIO-ECONOMY

- The bio-economy represent **17% of our world's total GDP**
- Globally around **1/3rd of food produced is lost or wasted** while food demand surges

MARKETS & MODELS

- There is a **$4.5 trillion business opportunity** for moving towards a circular economy
- **Business model** transformation, **procurement** and **supply chain** optimization can help obtain this

LEADERSHIP – Over 50 public and private organizations have joined PACE over the last 3 years with active leadership from the 3 co-chairs and 5 knowledge partners

Co-Chairs

Naoki Ishii CEO & Chair GEF

Frans van Houten CEO & Chair Philips

Erik Solheim Exec. Director UN Environment

Knowledge Partners

accenture strategy

ELLEN MACARTHUR FOUNDATION

WORLD RESOURCES INSTITUTE

International Resource Panel

CIRCLE ECONOMY

Leadership Group

COMPANIES

- **Frans van Houten, CEO & Chairman, Philips**
- Kees van Dijkhuizen, CEO, ABN AMRO
- Peter Lacy, Global Managing Director, Growth, Strategy and Sustainability, Accenture
- Eric Schmidt, Executive Chairman, Alphabet
- Lisa Jackson, VP Environment, Policy, Social Initiatives, Apple
- Greg Hodkinson, Chairman, Arup
- Malek Sukkar, CEO, Averda
- Chuck Robbins, CEO, Cisco
- Feike Sijbesma, CEO &Chairman, DSM
- Xu Kaihua, Chairman & President, GEM
- Leontino Balbo Junior, CEO, Grupo Balbo
- Dion Weisler, President & CEO, HP Inc.
- Jesper Brodin, CEO, IKEA
- Ralph Hamers, CEO, ING
- Carlo Messina, CEO, Intesa Sanpaolo
- Stefan Doboczky, CEO, Lenzing AG
- Arthur Huang, Founder & CEO, MiniWiz
- Jean-Louis Chaussade, CEO, Suez
- Christian Wessles, CEO, Sunray Ventures
- Tom Szaky, Founder & CEO, Terracycle
- James Quicey, President & CEO, The Coca Cola Company
- Gonzalo Munos, Co-Founder & CEO, Triciclos
- Paul Polman, CEO, Unilever
- Antoine Frerot, Chairman & CEO, Veolia
- Svein Tore Holsether, President & CEO, Yara International

GOVERNMENTS

- Fang Li, China Council for International Cooperation on Environment & Development
- Jyrki Kateinen, VP, Jobs, Growth, Investment and Competitiveness, European Commission
- Luhut Pandjaitan, Coordinating Minister of Maritime Affairs, Indonesia
- Stientje van Veldhoven, Minister for the Environment, Netherlands
- Thani Ahmed Al Zeyoudi, Minister of Climate Change and Environment for the United Arab Emirates
- Yoshiaki HARADA, Minister of the Environment, Japan
- Jakob Ellemann-Jensen, Minister for Environment and Food Denmark
- Ibrahim Jibril, Minister of Environment, Nigeria
- Vincent Biruta, Minister of Natural Resources, Rwanda
- Derek Hanekom, (acting) Minister of Environment and Water, South Africa
- Miro Cerar, Foreign Minister of Slovenia

REGIONAL / DEVELOPMENT INVESTMENT BANKS

- Werner Hoyer, President, European Investment Bank
- Luis Moreno, President, Inter-American Development Bank
- Kristalina Georgieva, CEO, World Bank

ORGANIZATIONS

- **Naoko Ishii, CEO, Global Environment Facility**
- **Erik Solheim, Executive Director, UN Environment**
- Zhao Kai, Secretary General, China Association on Circular Economy
- Harald Friedl, CEO, Circle Economy
- Ellen McArthur, Founder, Ellen MacArthur Foundation
- Scott Vaughn, President, International Institute for Sustainable Development
- Janez Potočnik, Co-Chair, International Resource Panel
- Izabella Teixeira, Co-Chair, International Resource Panel
- Janis Jones, CEO, Ocean Conservancy
- Peter Bakker, President, World Business Council for Sustainable Development
- Andrew Steer, President, World Resources Institute
- Marco Lambertini, CEO, World Wildlife Fund

>100 delegates from the member companies, governments, investment / development banks and organizations

To date PACE has actively driven outputs across the three pillars with a main focus on delivering large-scale public-private projects and catalyzing project investment

2018 outputs to date

PROJECTS

- Large-scale public-private projects — 3
- Affiliate projects — 9
- $12,2M*

LEADERSHIP

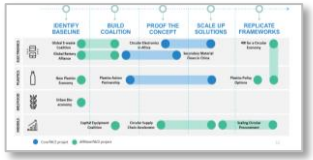
- Project investment catalysed — 54
- CEO & Minister memberships — 99
- C-level community delegates — 15
- Global events w/ PACE representation

LEARNINGS

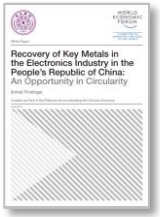
- Thought leadership products developed — 4
- Enabling frameworks developed — 0
- Blogs / stories published — 10

Tangible results

Legally established Producer Responsibility Organization for E-waste in Nigeria



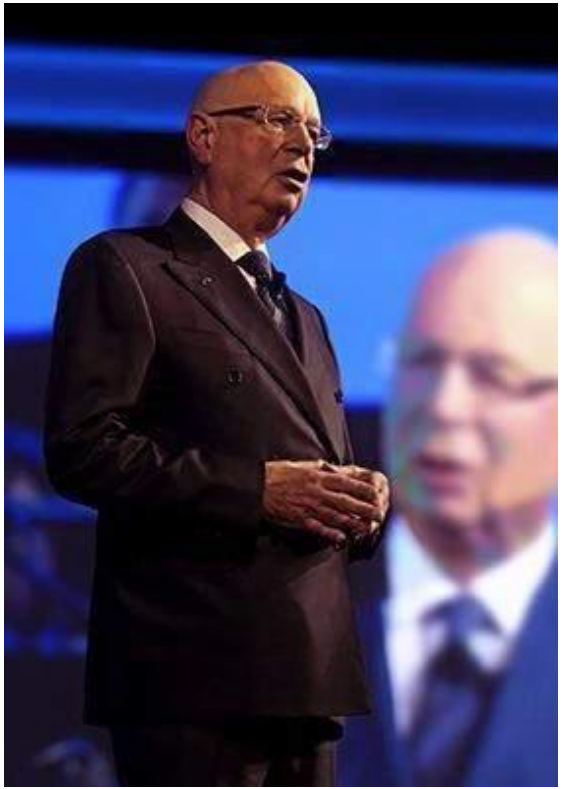
Sixth GEF Assembly
2018 WORLD CIRCULAR ECONOMY FORUM JAPAN
HIGH-LEVEL POLITICAL FORUM ON SUSTAINABLE DEVELOPMENT
WORLD ECONOMIC FORUM
CCICED



** See appendix details on the core projects*

The 4th Industrial Revolution

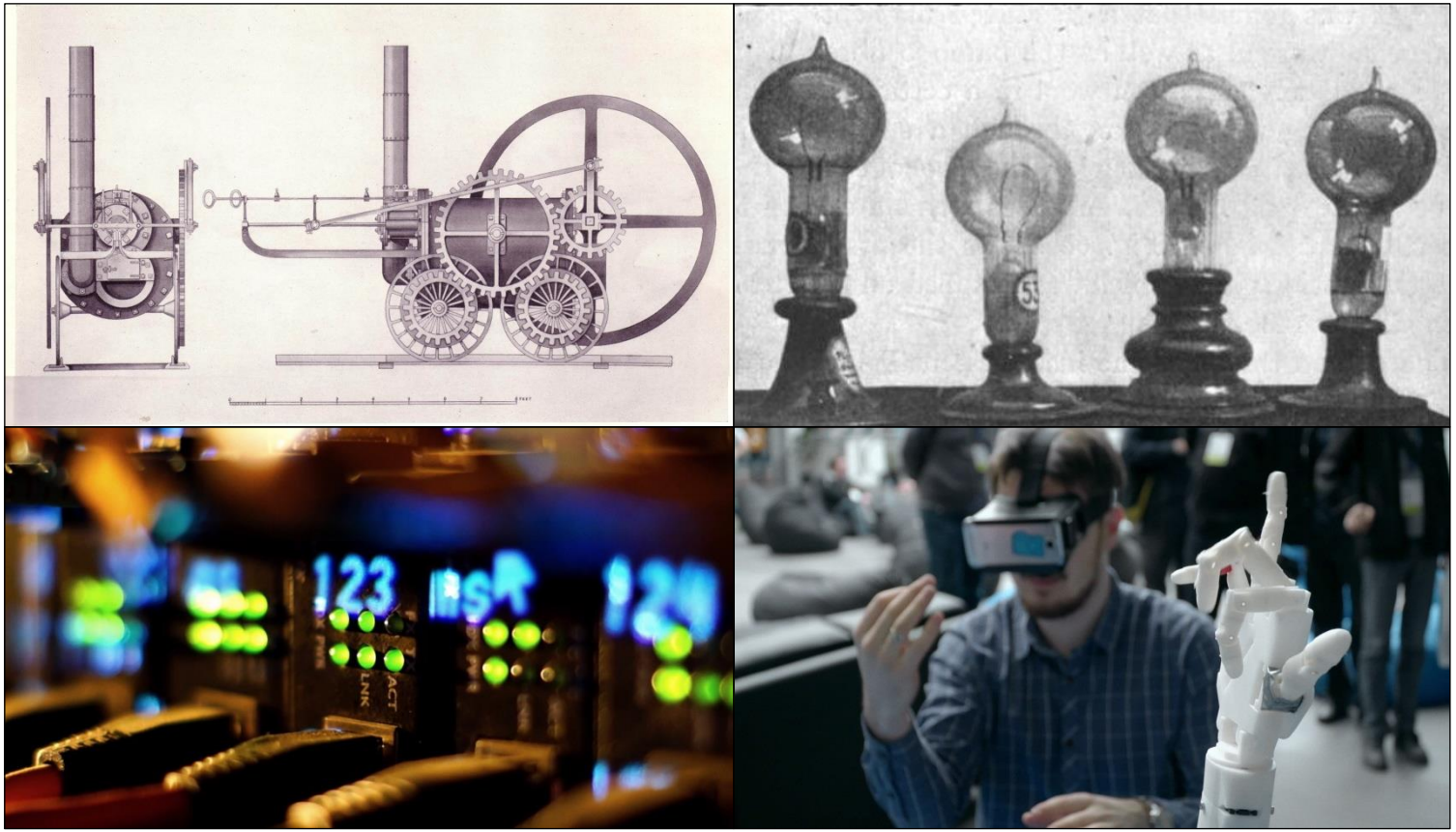
The Fourth Industrial Revolution



“The changes unleashed by the Fourth Industrial Revolution are so profound that, from the perspective of human history, there has never been a time of greater promise or potential peril.”

Klaus Schwab
Founder and Executive Chairman,
World Economic Forum

Layers of Change



WORLD ECONOMIC FORUM

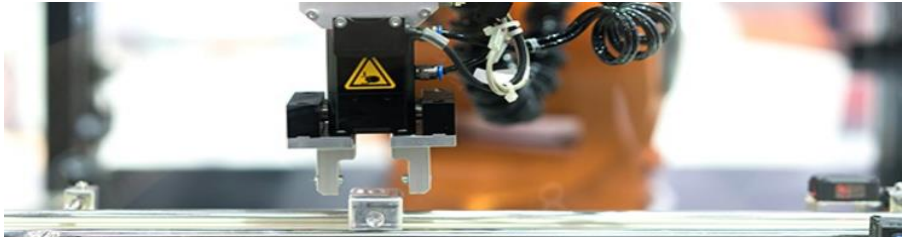
How can the Fourth Industrial Revolution be harnessed for Circular Economy?

What does this mean for the smart city?

What if, robots sorted waste?

WORLD ECONOMIC FORUM

Applying Machine Vision and Robotics for material identification and advanced sorting processes



AMP Robotics

- Combining the power of **Machine Vision** and **Robotics**
- Identifies household waste by material, type and even brand, automates sorting
- measures the degree of **contamination**
- Data trains the system, **constant improvement**

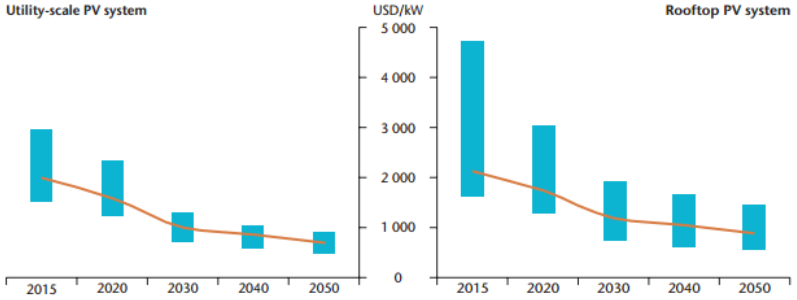
Tech giant's robotics solution for streamlining the disassembly process of complex electronic devices

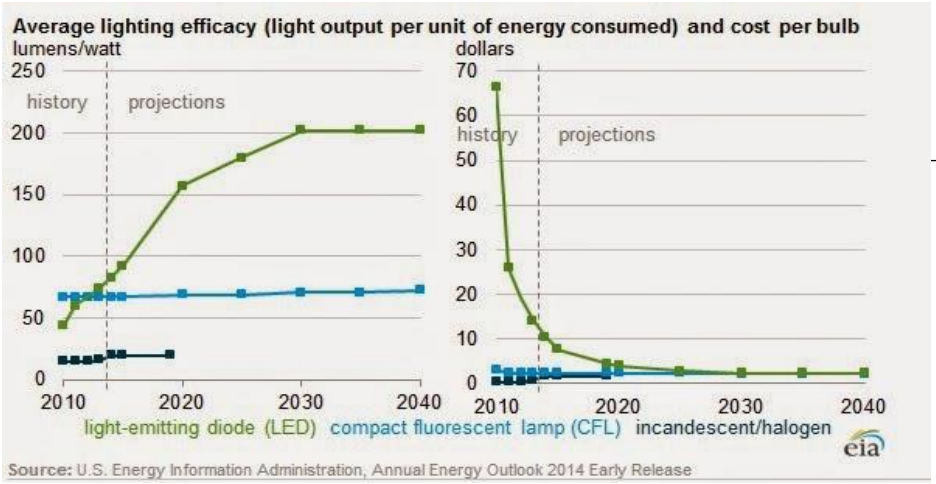
Apple

- Automate and streamline the disassembly process of the iPhone
- 200 iPhones per hour sorting its components into different material streams
- Committed to fully renewably sourced or recycled materials

What if, we grew our food in cities?

Figure 11: PV investments cost projections in the hi-Ren Scenario





THE PRICE OF WATER: 2015

Combined water, sewer and stormwater prices for households in 30 major U.S. cities.

What if, we grew our food in cities?

What if, value and information could be passed along the value chain?

WORLD ECONOMIC FORUM

A blockchain-based platform enabling secure information exchange between recyclers and manufacturers

Circularise

- **Trusted information exchange** between the recycler and producer of products
- Based on blockchain technology to enable recyclers to question manufacturers on the content of e-waste
- **Information on the content of e-waste required for effective processing is often unavailable and sensitive**

A data platform revolutionizing recycling in Latin America through tracking, incentivizing and certifying recycling

New Hope Ecotech

- The platform solution **tracks recycling volumes, ensures compliant recycling** and issues certificates
- The certificates are purchased by consumer goods companies as proof of adhering to legal obligations,
- The funds from certificate fees are distributed down the value chain to finance activities of recyclers, middlemen and waste pickers

What if, we grew our plastics?

Using agricultural waste to produce bio-based materials to replace plastics

Ecovative

- 100% compostable bio-based materials
- using living organisms derived from agricultural waste
- Similar in terms of quality and performance to virgin fossil-based plastics, but have lower CO2 emissions and can safely be composted

WORLD ECONOMIC FORUM

Takeaways:

Risk (if we don't do this) and reward (if we do)

Systems leadership, multiple actors coming together will be key

The Fourth Industrial Revolution will provide huge opportunities

Thank you!