

Economia Circolare

Modelli di Applicazione e opportunità di innovazione sostenibile

12 luglio 2017 - Modena

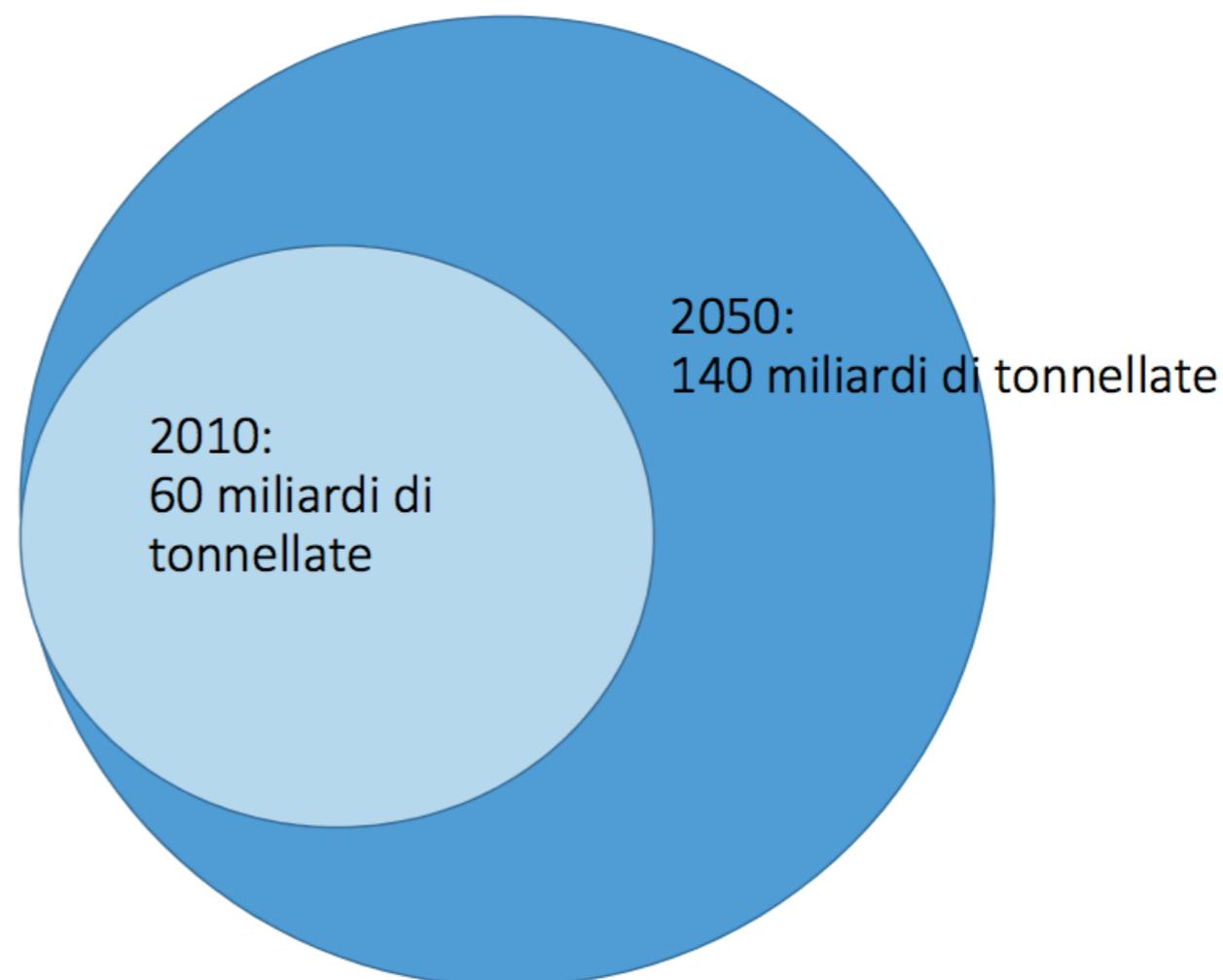
Loris Manicardi



Driver della Economia Circolare

> Trend nel consumo globale di risorse

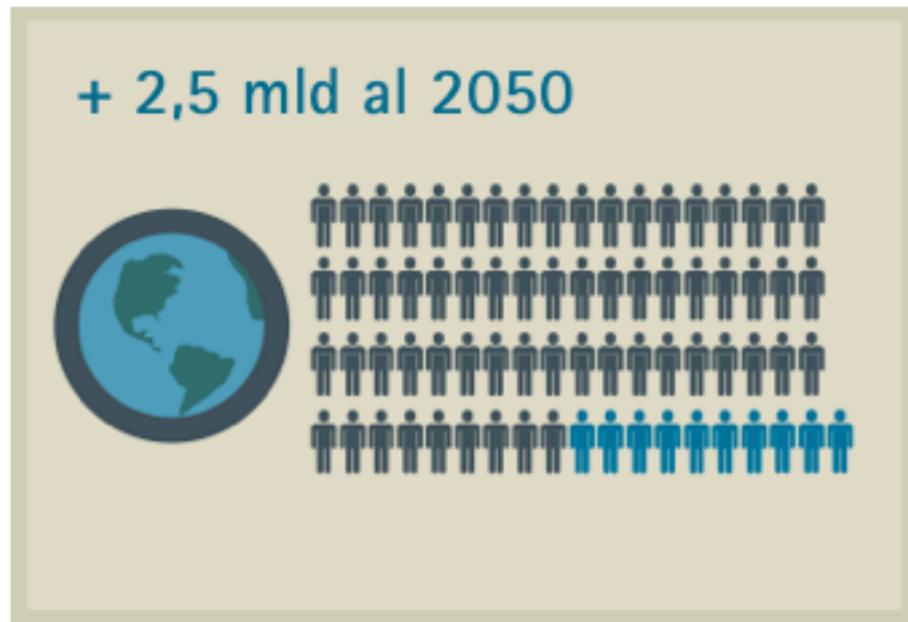
- Correlazione con la crescita economica > +0,4% per ogni aumento di un punto di Pil
- Incremento di 10 volte nel periodo 1900 - 2010
- 760 miliardi di Euro - spesa per approvvigionamento materie prime UE
- Carezza strutturale di risorse / materie prime a livello globale



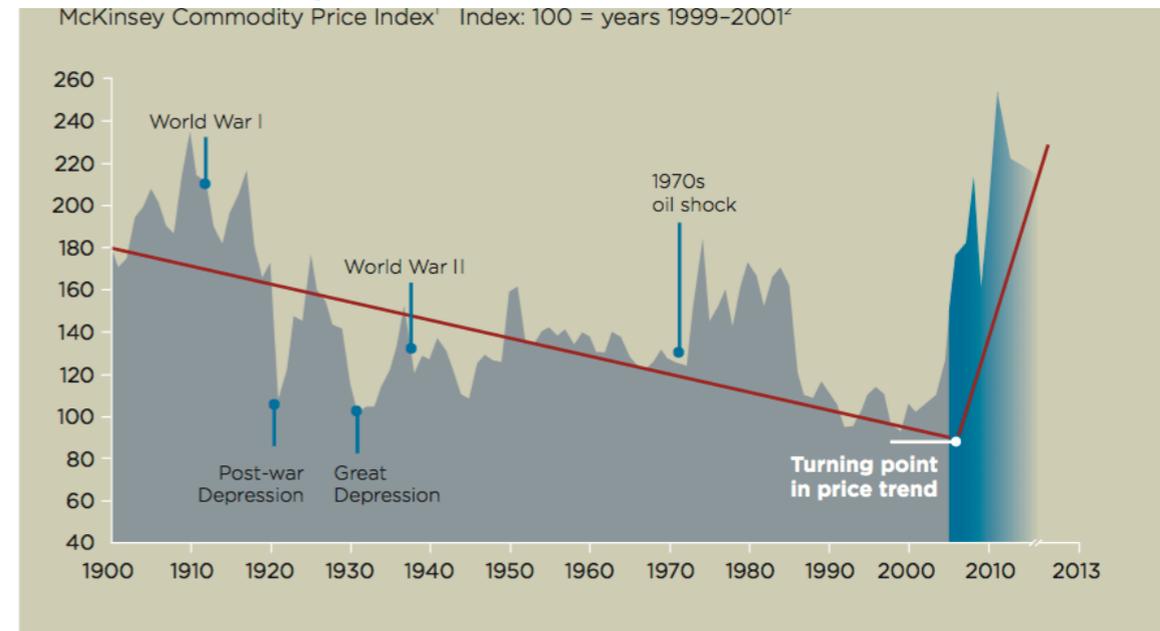
Driver della Economia Circolare

> Rischi e costi per le filiere produttive

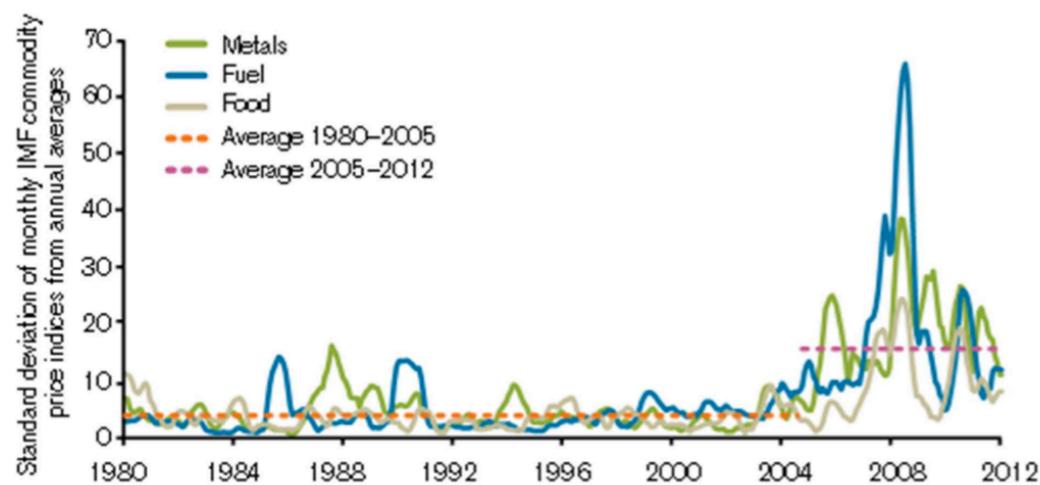
Aumento della popolazione globale



Incremento prezzo medio delle Commodity



Aumento della volatilità dei prezzi delle materie prime



Source: Resources Futures report for the World Bank, Chatham House, 2012

Estensione del perimetro normativo e fiscale collegato all'ambiente

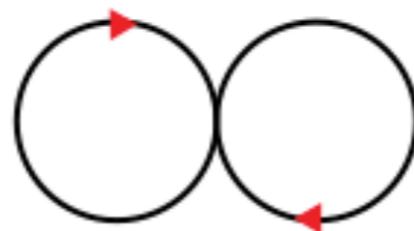


Modalità di creazione di valore in una Economia Circolare

> Sistema economico rigenerativo

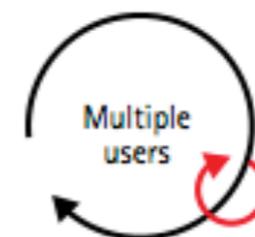
> Massimizzazione dell'estrazione del valore / utilità dei beni prodotti

> Superamento della produzione di ricchezza dall'utilizzo di materie prime ed energia a basso costo



Persistenza delle risorse

Eliminazione di input e output attraverso looping dei materiali e delle componenti dei prodotti



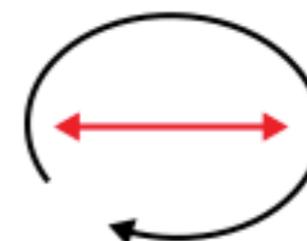
Mercati liquidi

Eliminazione del tempo di inattività dei prodotti per massimizzare il valore utilizzato



Collegamento delle catene del valore

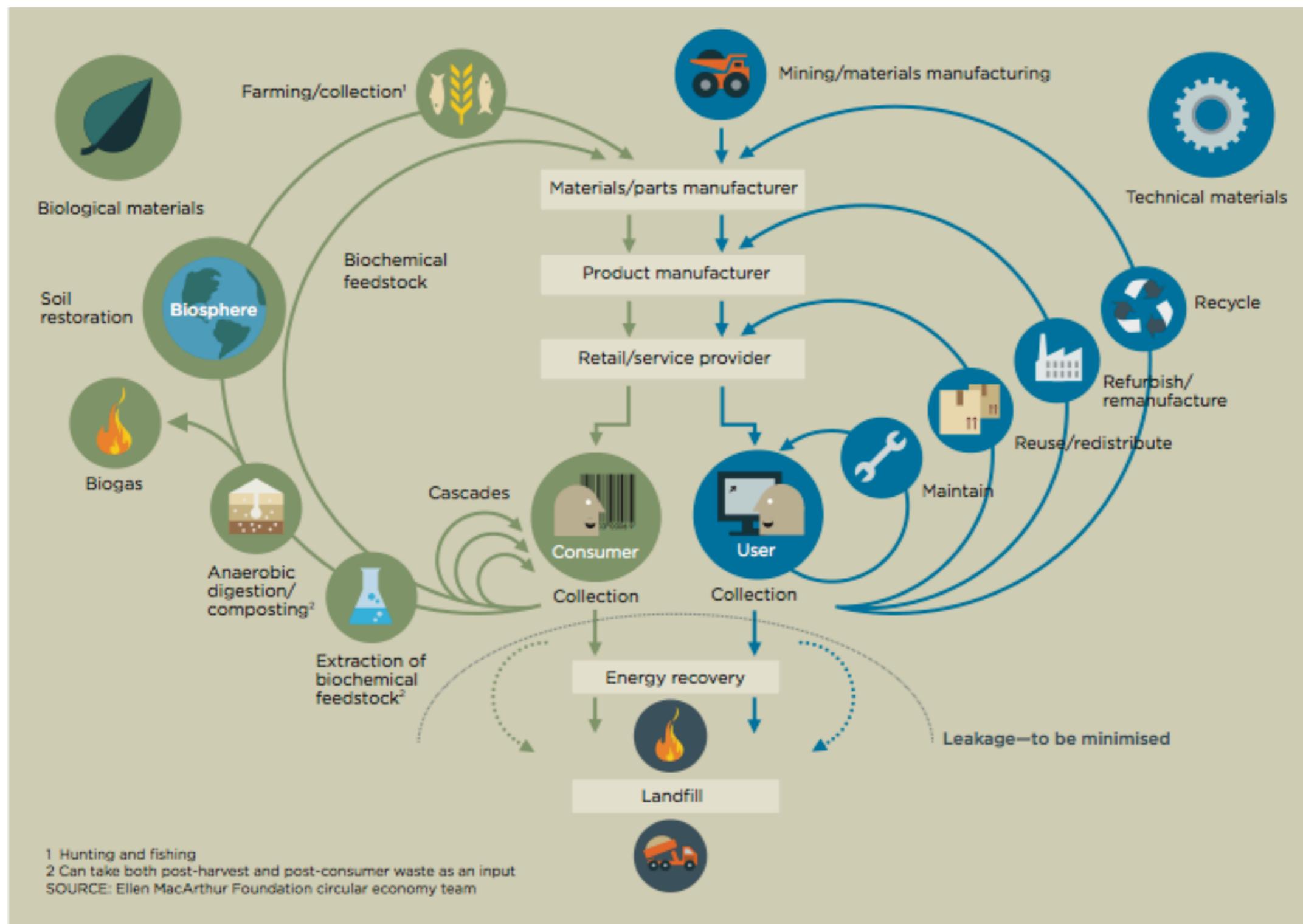
Utilizzare gli output da un processo di produzione-consumo come materie prime per un processo successivo



Ampliamento dei cicli di vita

Eliminare fenomeni di obsolescenza programmata e favorire prodotti e componenti resistenti anche grazie alla servitizzazione

Modello di Economia Circolare – rigenerativa e ricostitutiva “per design”



Traiettorie e flussi di rigenerazione del valore nell'Economia Circolare

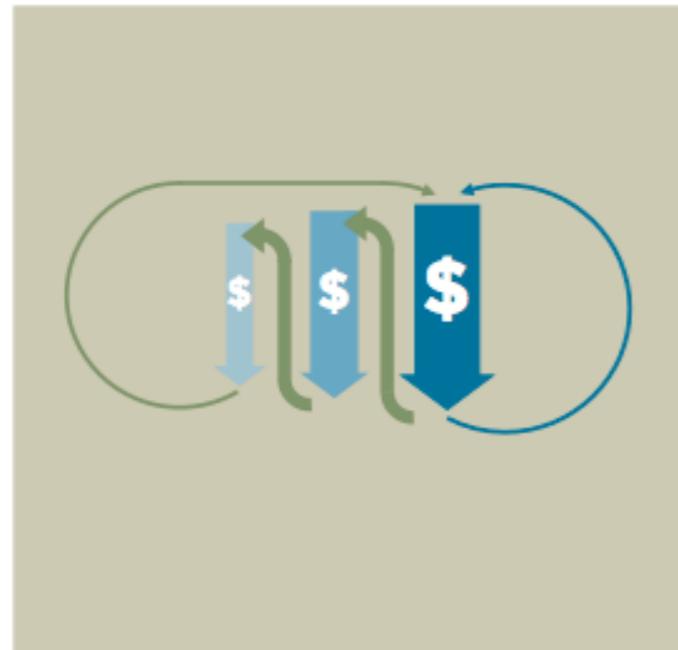
Regola del cerchio più interno



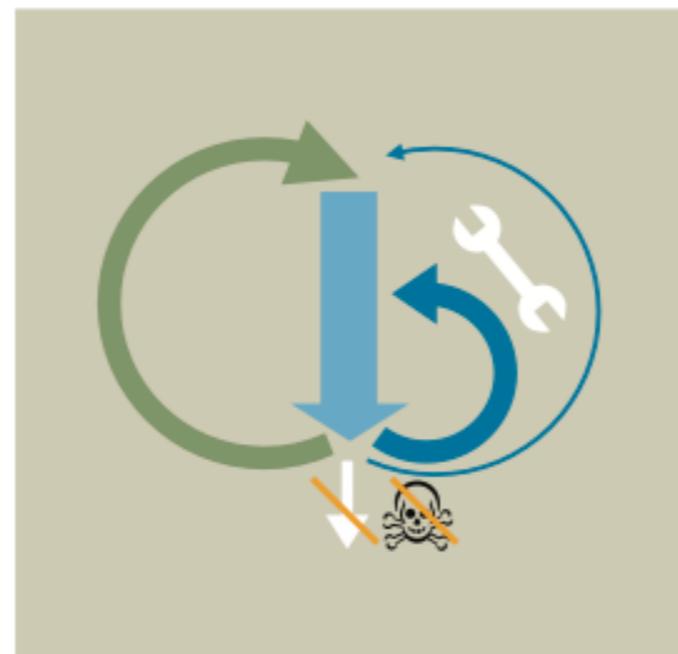
Regola del cerchio più lungo



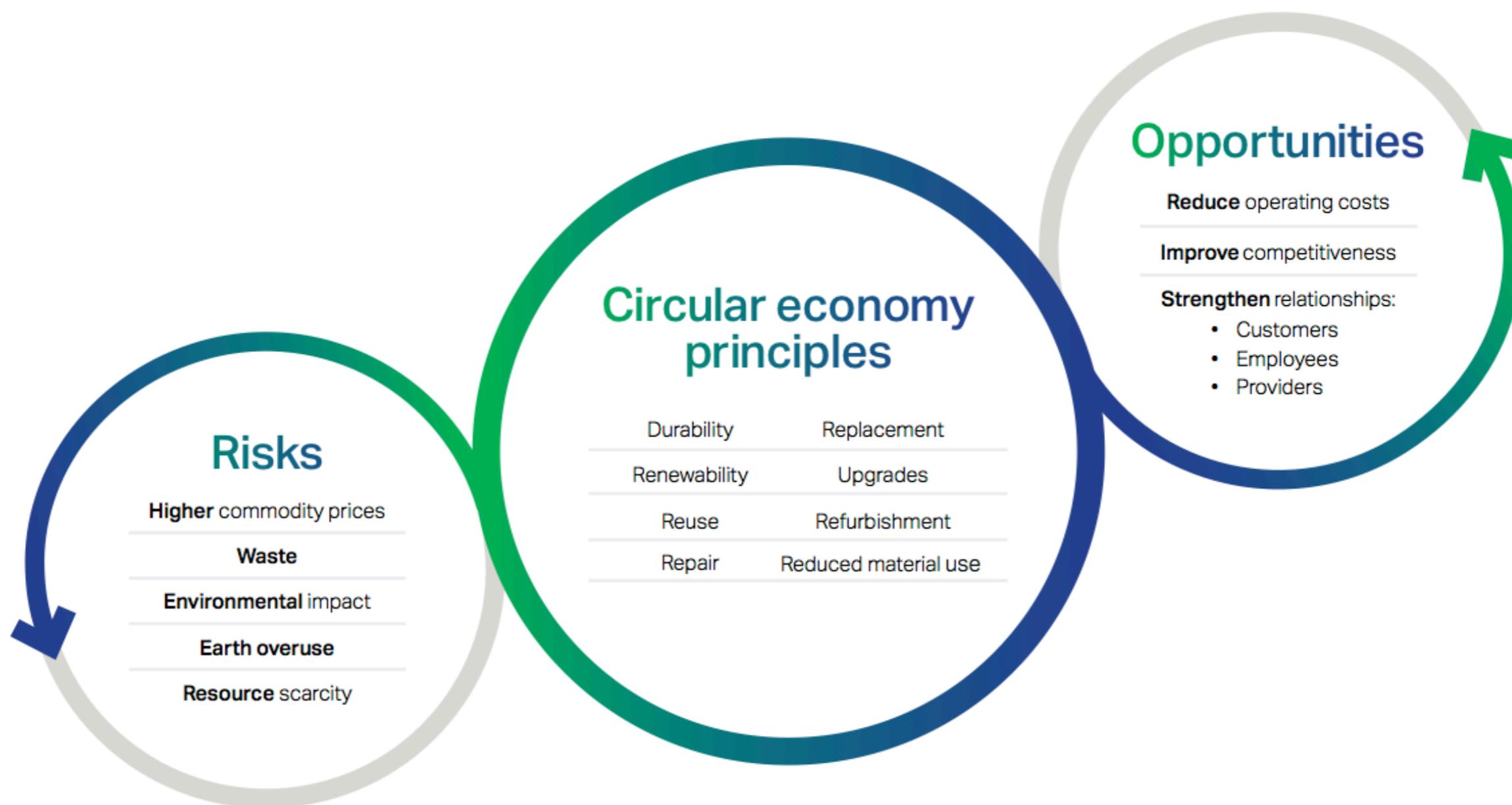
Regola degli utilizzi a cascata



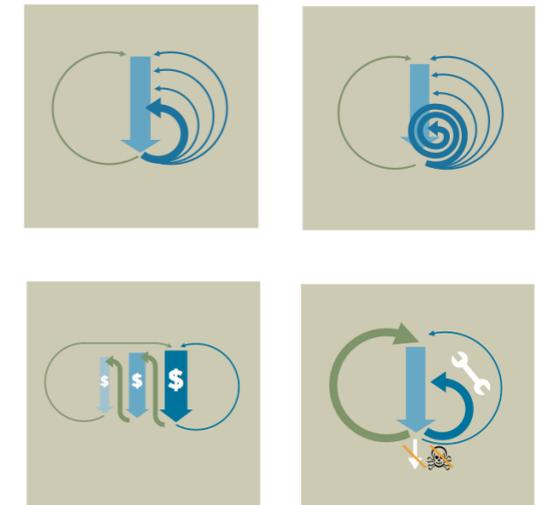
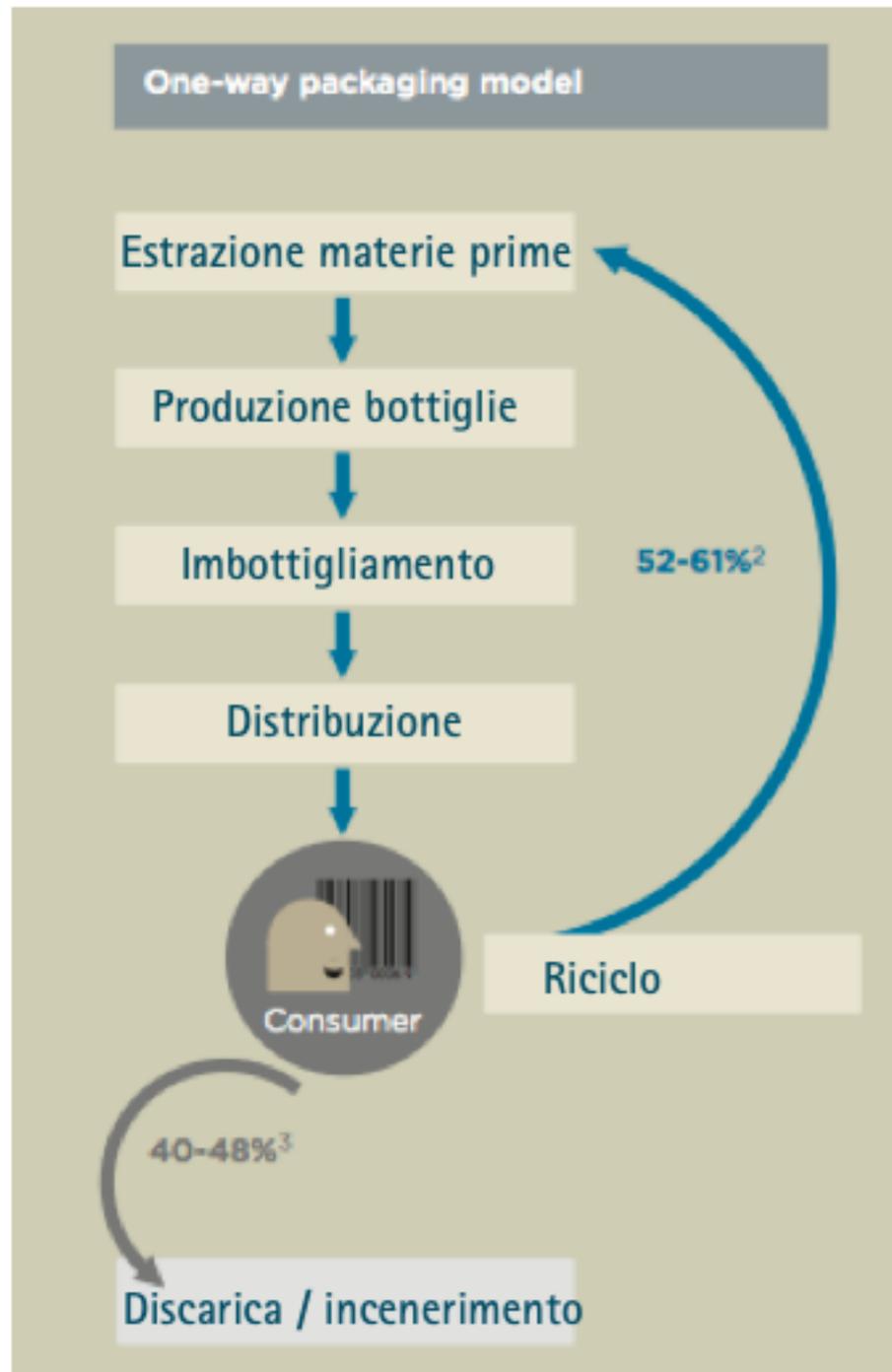
Regola della purezza degli input



Rischi strutturali attuali e nuove opportunità

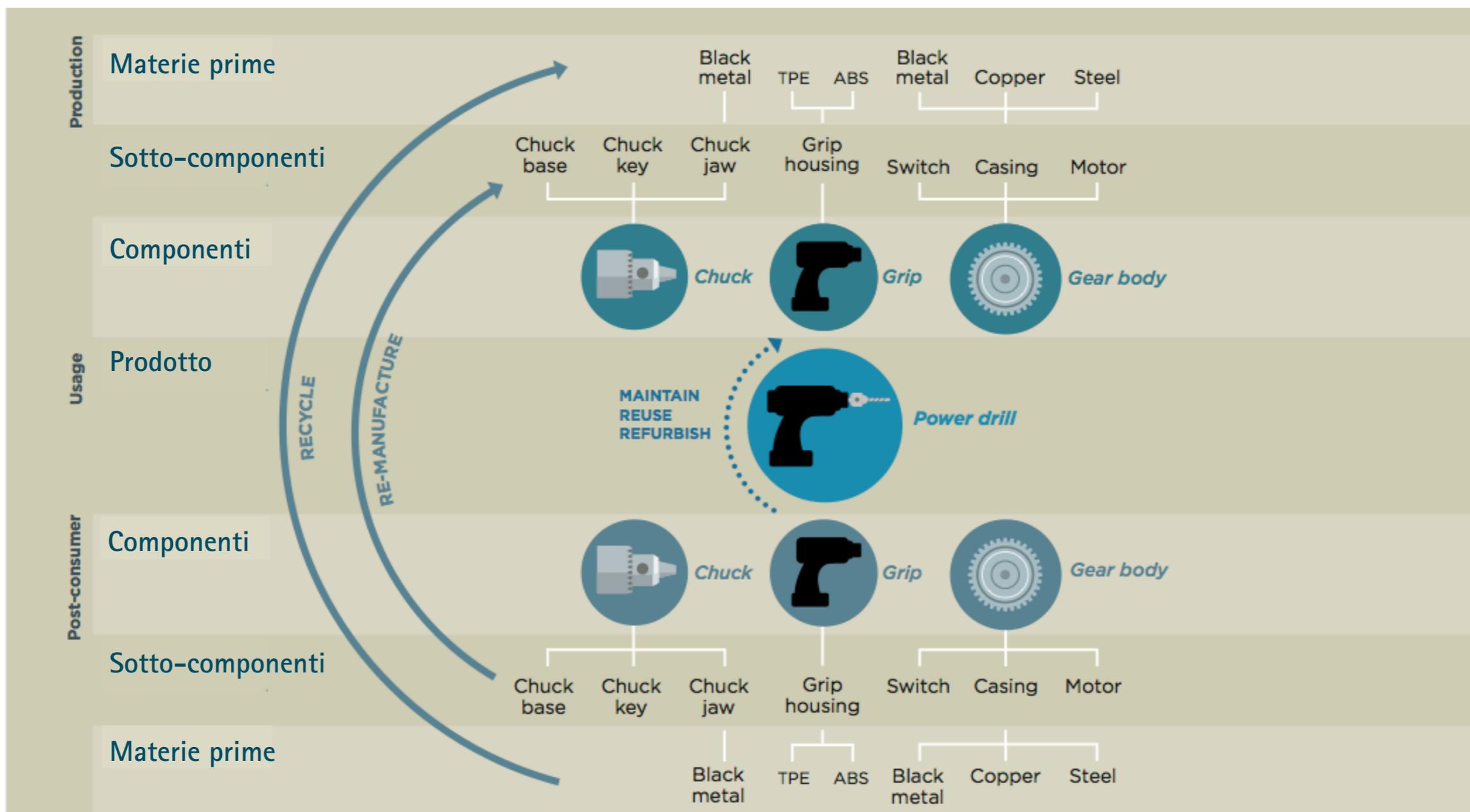


Un esempio – Filiera del Packaging della Birra in bottiglia di vetro



- riduzione del 20% dei costi di approvvigionamento di materie prime
- aumento della fedeltà della clientela attraverso lo schema di restituzione del vuoto
- riduzione dei costi di smaltimento rifiuti

Creazione della catena di ritorno (Reverse Supply Chain / Logistics)



SOURCE: Expert interviews; World Economic Forum and Ellen MacArthur Foundation circular economy team

Tipologie di Supply Chain – verso la circolarità dei flussi

FIGURE 14 Archetypes of supply chains and loops

	China ¹ Europe ²	Description	Case examples
1. Closed global/local/regional loop		<p>Global closed loops</p> <ul style="list-style-type: none"> End-of-use products or components are collected and returned to the countries where they were manufactured to be used in production of the same or similar products, largely at recycled material level 	
		<p>Regional closed loop</p> <ul style="list-style-type: none"> Products are mostly maintained in countries where usage takes place Some end-of-use/pre-owned products are collected, re-engineered/re-manufactured regionally, and sold into local markets 	
2. Partially open local/regional loop		<ul style="list-style-type: none"> End-of-use products or components are collected and returned to manufacturing facilities in the same regions to be used in the production of the same or similar products 	
3. Open cascade		<ul style="list-style-type: none"> For some valuable products, end-of-use materials are collected and sold to secondary markets, where material flows/end-of-use are not regulated, resulting in significant leakages 	
4. Linear		<ul style="list-style-type: none"> End-of-use products are discarded in landfills or incinerators of countries where consumption takes place 	<p>Relevant for 80% of materials used in FMCGs</p>

1 Or other manufacturing countries
 2 Analogous to the US and other importing regions

SOURCE: World Economic Forum and Ellen MacArthur Foundation circular economy team

La Circular Economy nel business – potenziali ambiti di azione

> La "bussola" RE.S.O.L.V.E.

REGENERATE



- Design di prodotto e processo con materiali rinnovabili
- Ripristino della qualità del capitale naturale
- Reimmissione dei materiali di origine biologica nella biosfera

SHARE



- Condivisione degli asset (sharing)
- Riutilizzo dei prodotti in mercati secondari
- Design for durability e servitizzazione

OPTIMISE



- Incremento efficienza di prodotto e processo
- Eliminazione degli scarti produttivi nella supply chain
- Tecnologie e processi 4.0

LOOP



- Rifabbricazione
- Riutilizzo / Ricondizionamento
- Bioraffinerie / Impianti digestione anaerobica

VIRTUALISE



- Sostituzione della fruizione di prodotti con servizi

EXCHANGE



- Utilizzo di materiali innovativi
- Tecnologie innovative (es 3D printing)
- Innovazioni di sistema (es. intermodalità dei trasporti)

Modello di Business "circolare" - integrazione di azioni nella catena del valore del prodotto

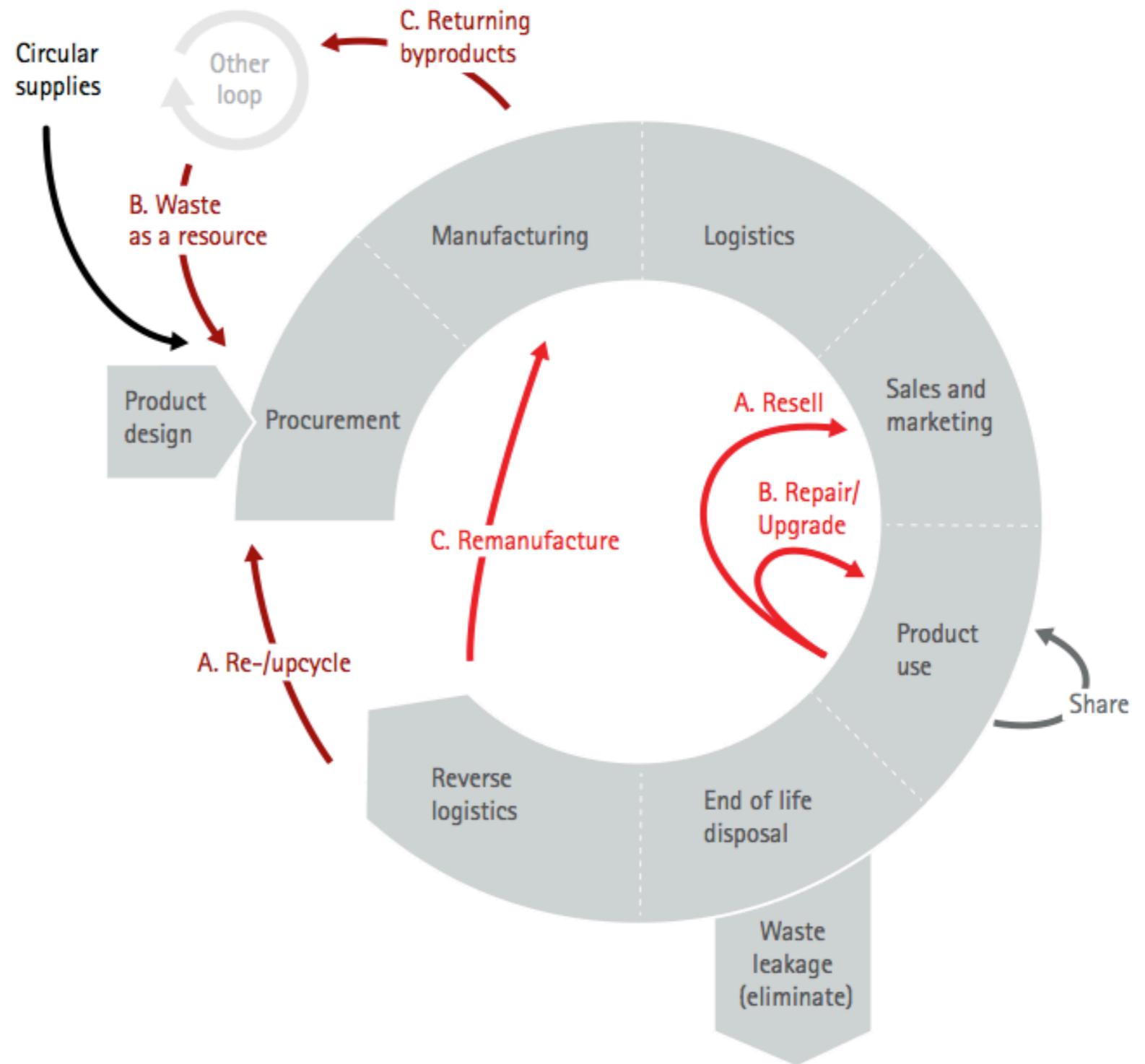
■ Approvvigionamenti Circolari

■ Recupero delle risorse

■ Estensione del ciclo di vita dei prodotti

■ Piattaforme di condivisione

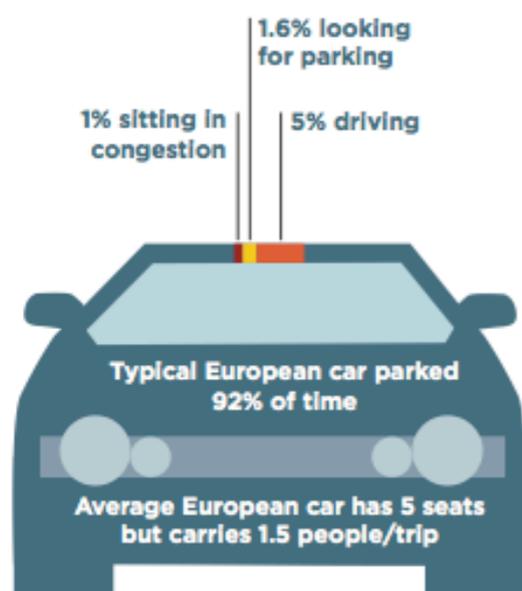
■ Product as a Service



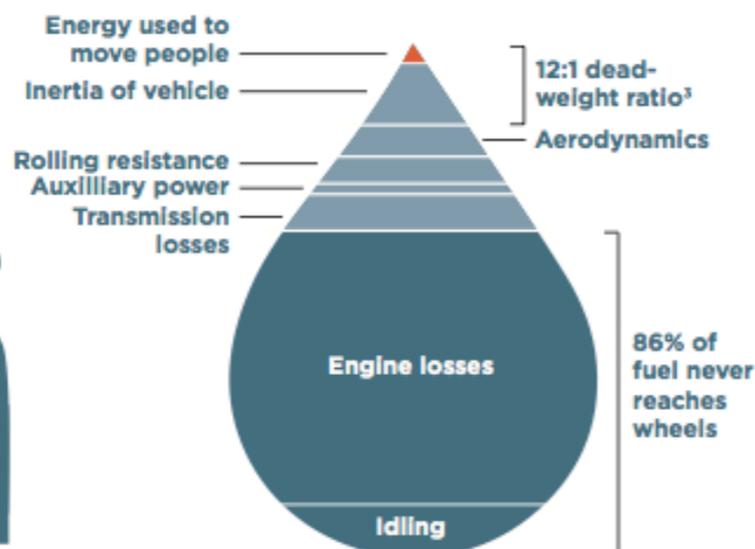
Mobilità - Applicazione del modello Circolare

FIGURE 3 STRUCTURAL WASTE IN THE MOBILITY SYSTEM

CAR UTILISATION¹

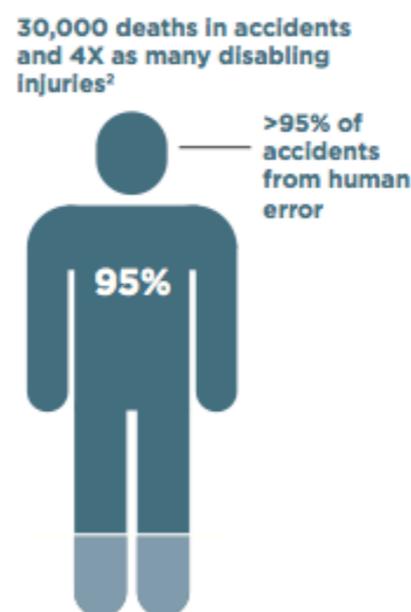


TANK-TO-WHEEL ENERGY FLOW - PETROL



● Productive use

DEATHS AND INJURIES/ YEAR ON ROAD



LAND UTILISATION: **5%** Road reaches peak throughput only 5% of time and only 10% covered with cars then **50%** 50% of most city land dedicated to streets and roads, parking, service stations, driveways, signals, and traffic signs

- REGENERATE
- SHARE
- OPTIMISE
- LOOP
- VIRTUALISE
- EXCHANGE

¹ Based on car parked number for France and productive vs. unproductive driving time in US. ² For every death on Europe's roads there are an estimated four permanently disabling injuries. ³ Based on average car weight of 1.4 tonnes and average occupation of 1.5 passengers of 75 kg.
Source: EU Commission mobility and transport, accident statistics; www.fueleconomy.gov; EEA car occupancy rates data; S. Heck and M. Rogers, *Resource revolution: How to capture the biggest business opportunity in a century*, 2014; Centre d'études sur les réseaux, les transports, l'urbanisme et les constructions publiques.

Mobilità - Applicazione del modello Circolare



- Durabilità dei veicoli e delle componenti
- Rifabbricazione componenti
- Materiali facilmente riciclabili
- Produzione modulare e disassemblabile



- Mobilità elettrica
- Guida autonoma

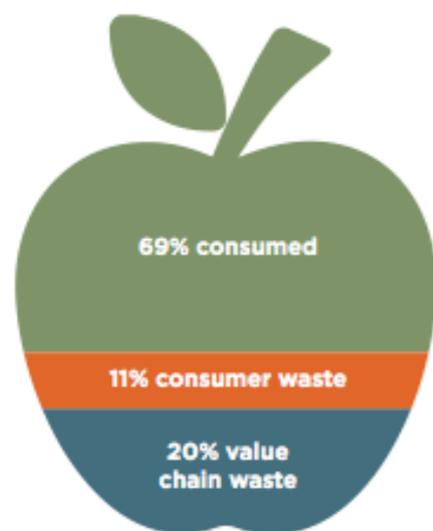


- Dinamiche di condivisione (car / ride sharing)
- Servitizzazione della mobilità (on-demand)
- Sistemi di intermodalità a livello urbano
- Riduzione degli spostamenti - smart working, remote working

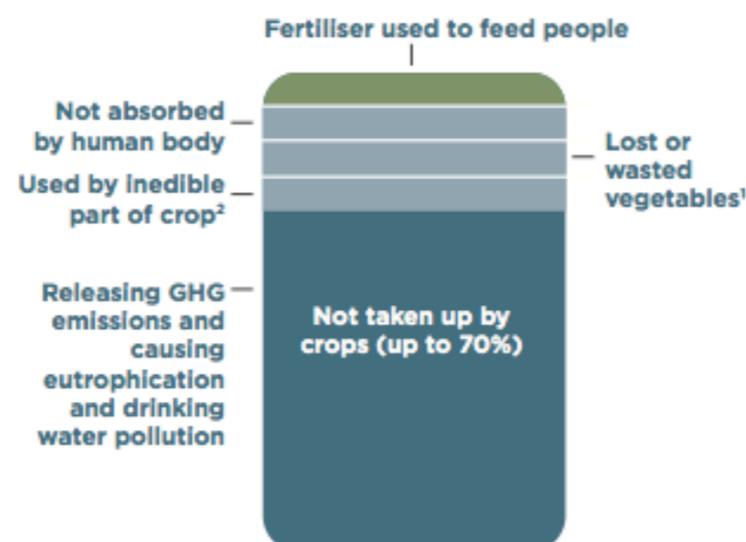
Alimentazione - Applicazione del modello Circolare

FIGURE 4 **STRUCTURAL WASTE IN THE FOOD SYSTEM**

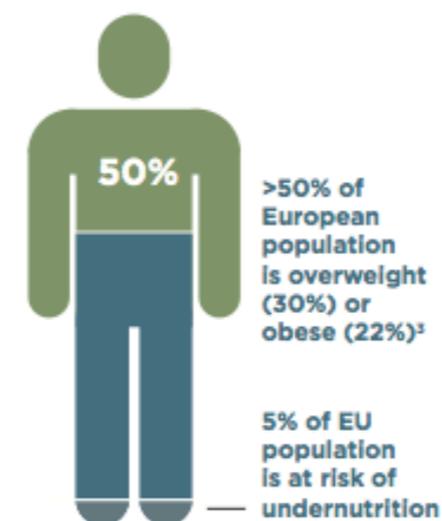
FOOD WASTE
31% of food produced is lost or wasted



FERTILISER UTILISATION
95% of fertilisers do not provide nutrients to human body



MALNUTRITION DEATHS AND DISEASES
Obesity causes 5% of deaths



● Productive use

LAND DEGRADATION: 30-85% -30-85% of European agricultural land is affected by soil degradation (range depending on definition and data set used)

¹ In Europe -46% of edible mass of fruit and vegetables is lost or wasted (FAO, Global food losses and food waste, 2011).

² On average 23% of vegetable crops are not edible (peels, leaves, etc.). ³ BMI >25 (overweight) or >30 (obese).

Source: FAO, *Global food losses and food waste - Extent, Causes and Prevention*, 2011; MGI, *Overcoming obesity: An initial economic analysis*, 2014; WHO website obesity data; EEA, *Towards efficient use of water resources in Europe*, 2012; IFDC; Olle Ljungqvist and Frank de Man, *Under-nutrition - a major health problem in Europe*, 2009; Holly Gibbs and Meghan Salmon, *Mapping the world's degraded lands*, 2015.

REGENERATE



SHARE



OPTIMISE



LOOP



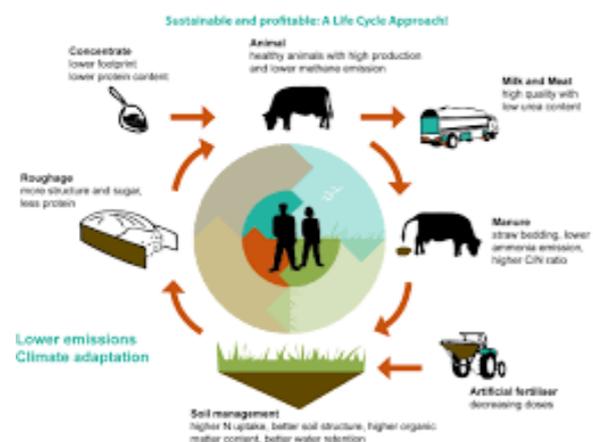
VIRTUALISE



EXCHANGE



Alimentazione - Applicazione del modello Circolare



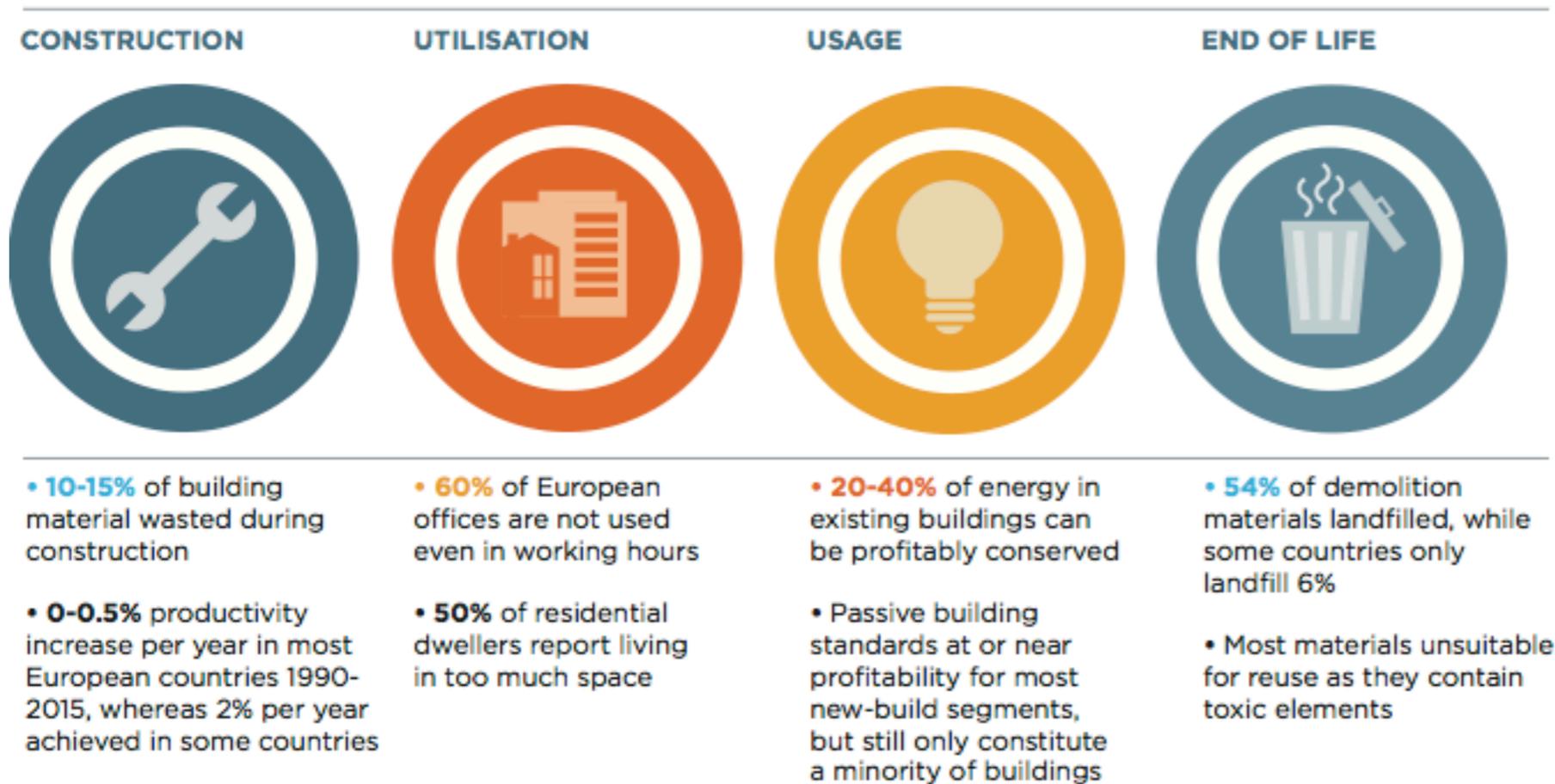
- Closed-loop farming
- Digestione Anaerobica
- Agricoltura di precisione, sensori, droni, Gis, satellite
- No tilling
- Urban e Peri-urban Farming

- Rigenerazione degli ecosistemi naturali e degli agro-ecosistemi
- Chiusura dei cicli degli elementi
- Valutazione dei servizi degli ecosistemi
- Resilienza al Cambiamento Climatico

- Riduzione degli sprechi sulla filiera

Abitazione - Applicazione del modello Circolare

FIGURE 5 STRUCTURAL WASTE IN THE BUILT ENVIRONMENT



URBAN PLANNING:

- 50% of most city land dedicated to infrastructure
- 11 million households experience severe housing deprivation
- Congestion cost 2% of GDP in many cities

Source: Norm Miller, *Workplace Trends in Office Space: Implications for Future Office Demand*, University of San Diego, 2014; GSA Office of Governmentwide Policy, *Workspace Utilization and Allocation Benchmark*, 2011; Flexibility.co.uk, *Shrinking the office*; IEA Statistics © OECD/IEA (<http://www.iea.org/stats/index.asp>) Energy Statistics and Balances of Non-OECD Countries, Energy Statistics of OECD Countries, and United Nations, *Energy Statistics Yearbook*; European Commission, *Service contract on management of construction and demolition waste*, 2011.

REGENERATE



SHARE



OPTIMISE



LOOP



VIRTUALISE



EXCHANGE



Abitazione - Applicazione del modello Circolare



- Industrializzazione dei processi
- Materiali sostenibili e durevoli
- Disassemblabilità dei moduli
- Modularità degli spazi
- Stampa 3D



- Efficienza energetica
- Energie rinnovabili
- Smart home / domotica
- Building Information Modeling (BIM)



- Space Sharing (case, uffici, ecc.)

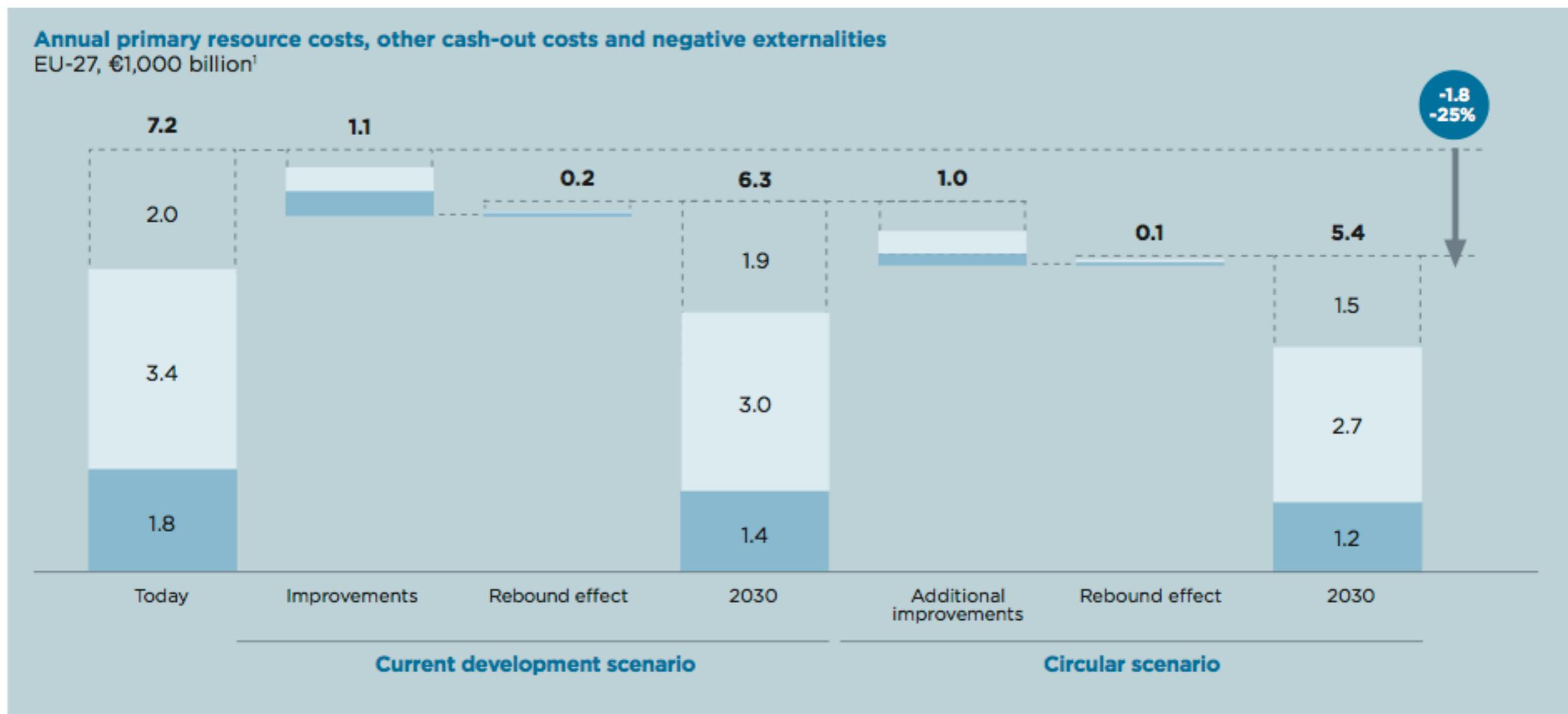
Tecnologie abilitanti

		Circular Supplies	Resource Recovery	Product Life Extension	Sharing Platforms	Product as a Service
 Digital	Mobile			1 icon	3 icons	
	M2M				2 icons	2 icons
	Cloud				2 icons	2 icons
	Social			1 icon	3 icons	2 icons
	Big Data Analytics	1 icon			2 icons	3 icons
 Hybrid	Trace and return systems		2 icons	3 icons	1 icon	
	3D Printing	1 icon		2 icons		
 Engineering	Modular design technology		1 gear icon	1 gear icon		1 gear icon
	Advanced recycling tech	1 gear icon	3 gear icons			
	Life and Material sciences	2 gear icons	1 gear icon			

**Based on 120+ case studies and 50+ interviews*

Number of icons in respective boxes indicate relative importance

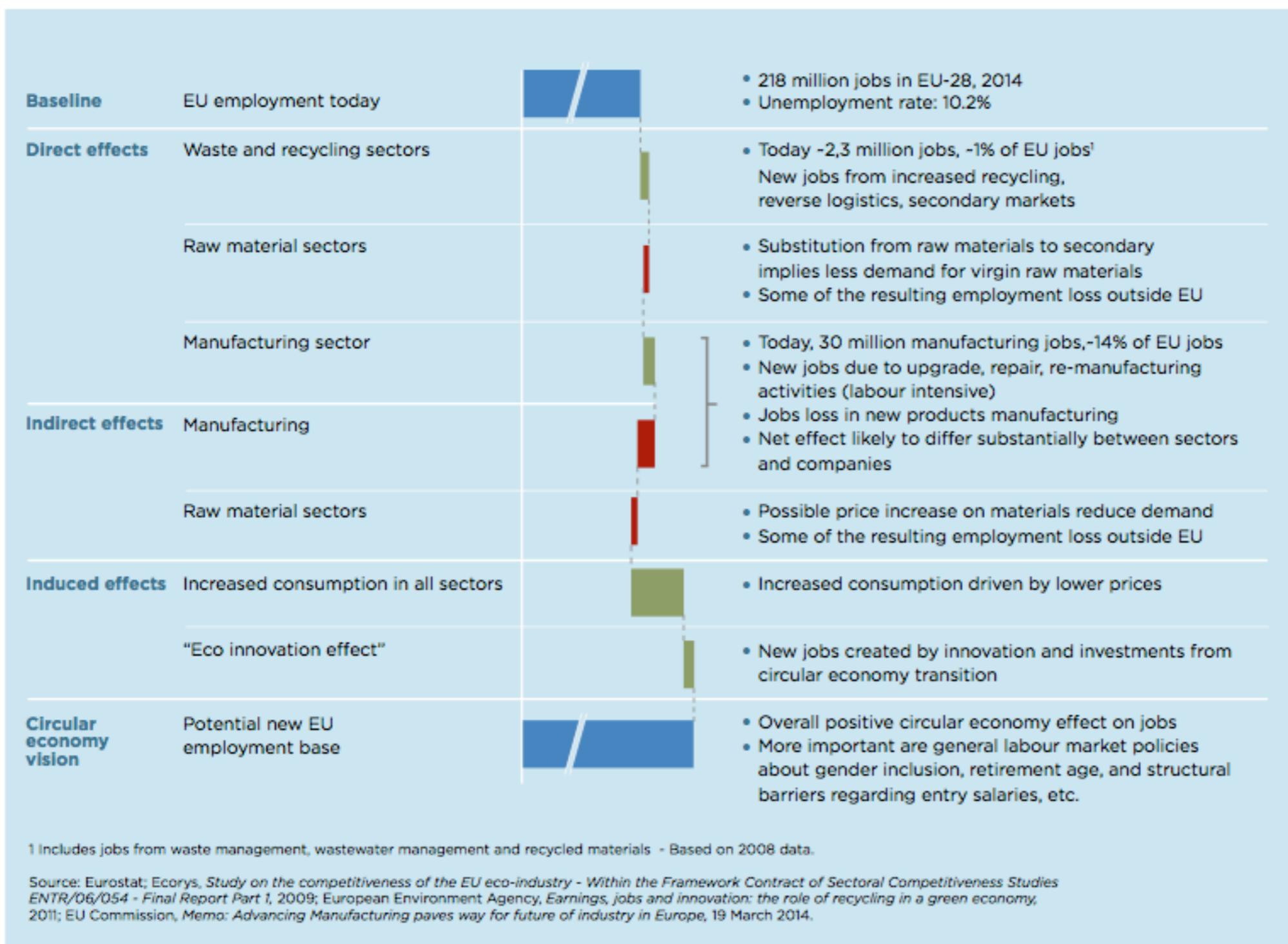
Opportunità economiche della Circular Economy



¹ All numbers rounded to €100 billion. ² Primary resources include virgin automotive and construction material, virgin synthetic fertiliser (€535/tonne), pesticides, agriculture land and water use (€0.20/m²), fuel (€1.64/litre gasoline, €1.45/litre diesel, €0.91/litre of heating oil, €68/tonne of coal, €0.067/kWh of natural gas), land for residential and office buildings and non-renewable electricity (€0.20/kWh). ³ Other cash-out costs include all household and government expenditures on mobility, food, residential housing and office space, excluding the primary resource costs. ⁴ Externalities include CO₂ (€29/tonne), traffic congestion, non-cash health impacts of accidents, pollution and noise, land opportunity costs, opportunity costs related to obesity, adverse health effects due to indoor environment and transport time (related to urban planning). NOTE: Numbers may not sum up due to rounding.

Source: See page 36

Risvolti occupazionali sull'economia - previsioni



Integrazione nelle policy globali, europee, nazionali e regionali



Piano d'Azione UE sull'Economia Circolare
> proposte di modifica di direttive sui rifiuti (rifiuti + discariche, imballaggi, veicoli f.u., Pile e accumulatori e Raee)

Al 2030:

- 70% riciclaggio rifiuti urbani
- -30% al 2050 e -50% al 2030 sprechi alimentari
- -80% rifiuti da imballaggio
- 5% max rifiuti in discarica



Legge di stabilità e Collegato ambientale



Regione Emilia-Romagna

Legge n.16 / 2015

Entro il 2020:

- - 20-25% rifiuti urbani pro-capite
- 73% raccolta differenziata
- 70% riciclaggio dei materiali
- Contenimento utilizzo discariche
- Autosufficienza nello smaltimento

Call to action – da dove iniziare?



Set a **circular vision**

Leadership can create the business imperatives, cultural changes and governance to promote the circular mindset, objectives and integrated goals/metrics.



Choose **your circular model**

Move beyond waste and recycling to leverage the full suite of circular business models. Use disruptive technologies to make the most of your circular transformation.



Work **in teams**

Achieving a circular transformation requires teamwork across functional areas (i.e. R&D, procurement, supply chain, manufacturing and marketing).



Start **small** and scale

To get started, start small and pilot innovative programs that could lead to long-term strategies. Celebrate successes, re-evaluate failures and work on scaling up.



Collaborate

Join forces across value chains in forums like Factor10. Engage with other companies and stakeholders to remove barriers and work on solutions that will create growth while reducing impact.



Track **progress**

Use financial, environmental and social metrics to measure and track the impact circular innovation has on business.



Grazie dell'attenzione

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