

Global Multi-Value Circulation for “Mottainai” society with higher resource efficiency

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External Trade Organization
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ISO has determined to standardize Circular Economy.

contents

- My Understandings on Circular Economy
- My Anxiety on Circular Economy
- New movement of Circular Economy in Japan
- My recommendation to develop Circular economy



We are mining urban mine now!

My都市鉱山バッグを日本中に広めよう



My都市鉱山バッグは、エコマテリアルフォーラムが考案した、都市鉱山開発のツールです。他の資源ゴミと違って巡回収集のない小型家電、それを我が家で一度貯めておいてまとめて回収場所に持ち寄るための紙袋です。



My都市鉱山バッグ

サイズ 約220x200x120mm

Designed by Wataru TAKAYANAGI in NIES

ゆくゆくは、全国の自治体で配布したり、自主回収に使ったりするといいですね。

だから、これをみんなで流行らせましょう。



Destroyer of natural resource



地球をこわされて怒りだした
テラのサウルス

Eco-ruecksuck of
mining



47.8ton of TMR



95.1g

Destroyer with waste



使ったものを捨て散らかす
ステテコウサウルス

Eco-ruecksuck for
Hearing E-waste



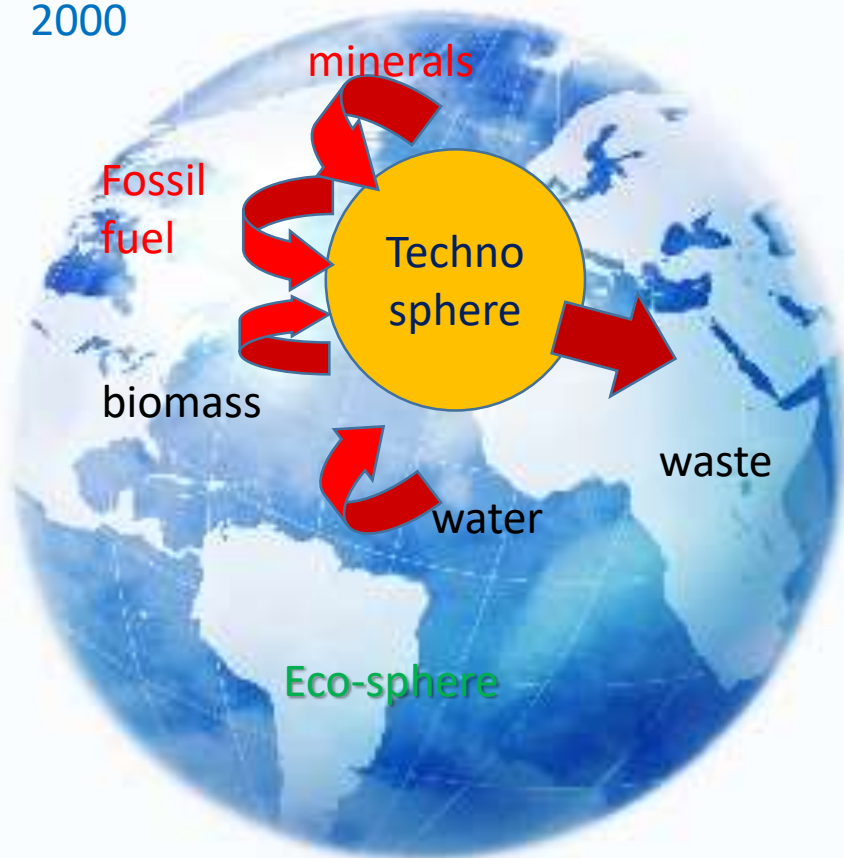
1600ton of TMR to hear

One recycled medal improve the resource efficiency.

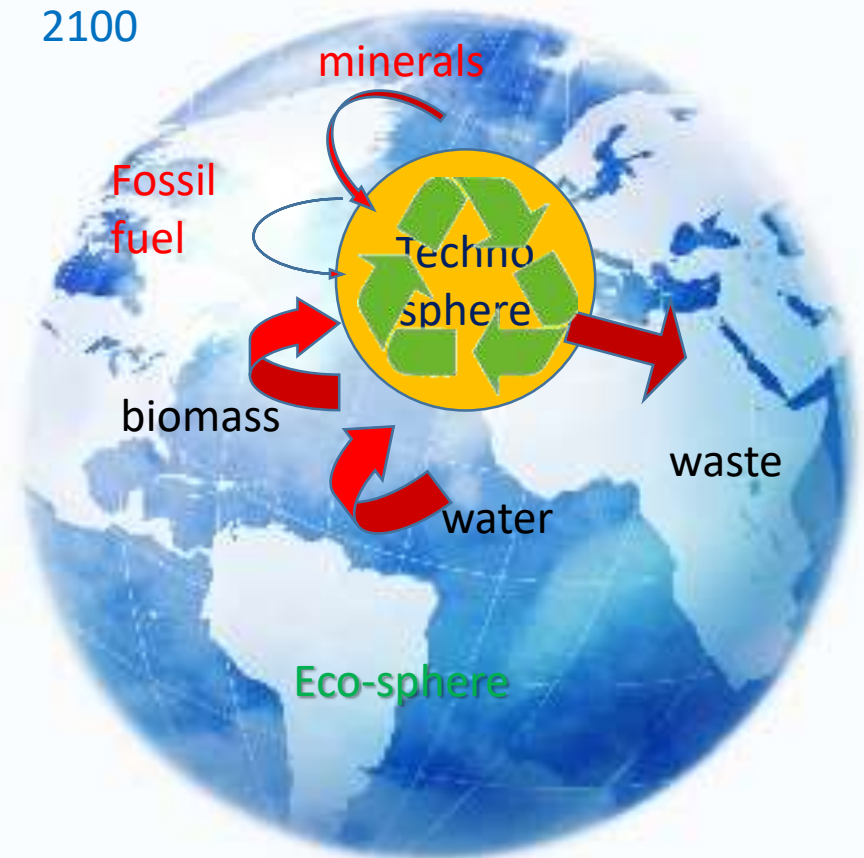
The world at 2100

- The minerals and fossil fuels from natural resource will be nearly zero.

2000

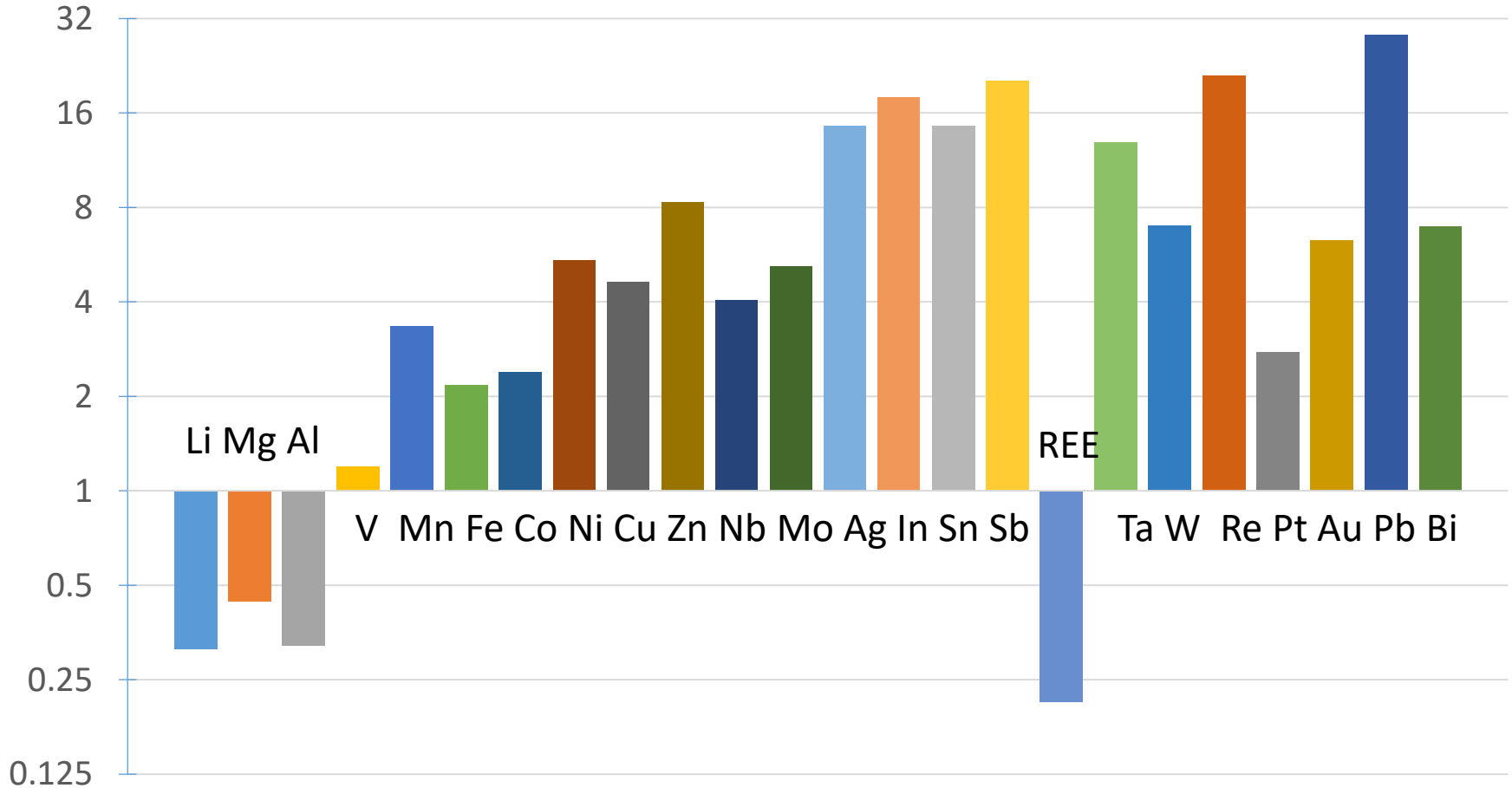


2100

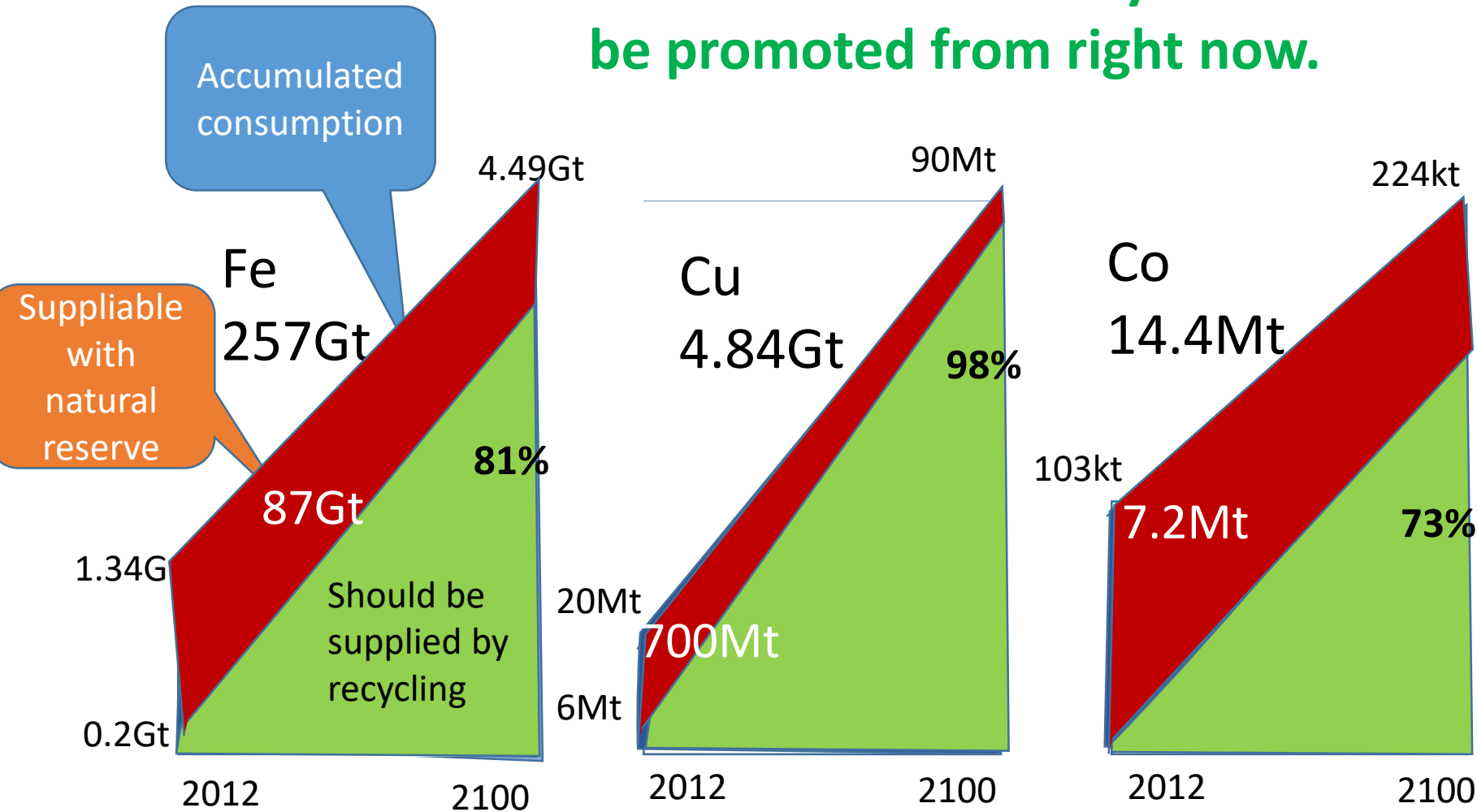


Much more times of resources will be required by 2100.

Estimated demand up to 2100 v.s. current reserve amount



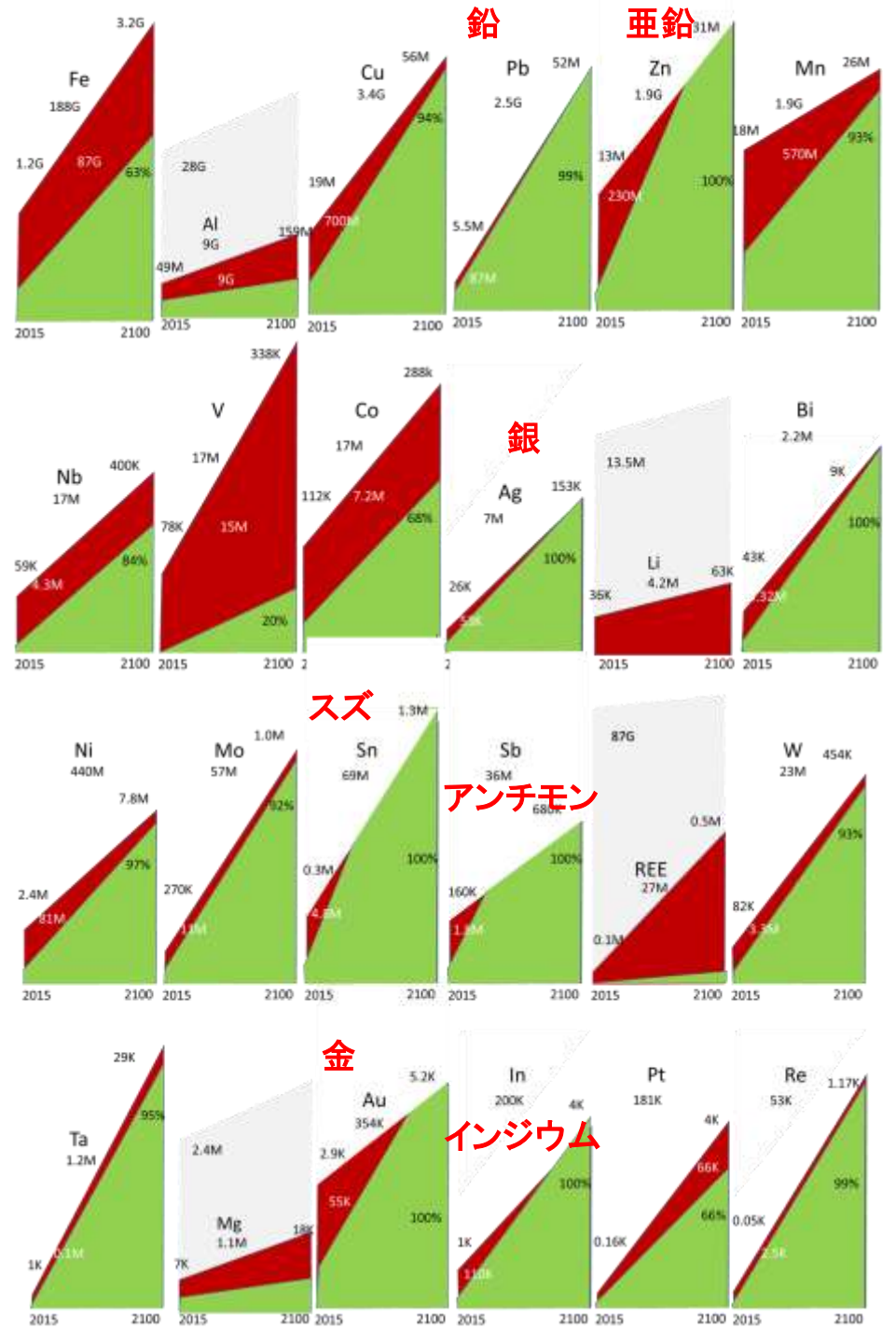
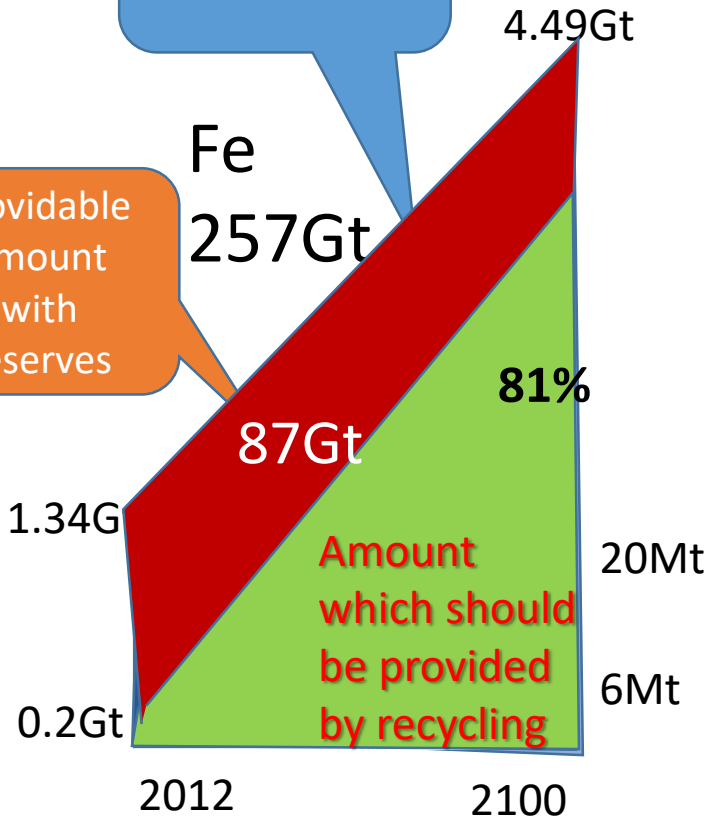
The circulation society must be promoted from right now.



Estimated accumulated consumptions till 2100 with simple assumption of linear growth

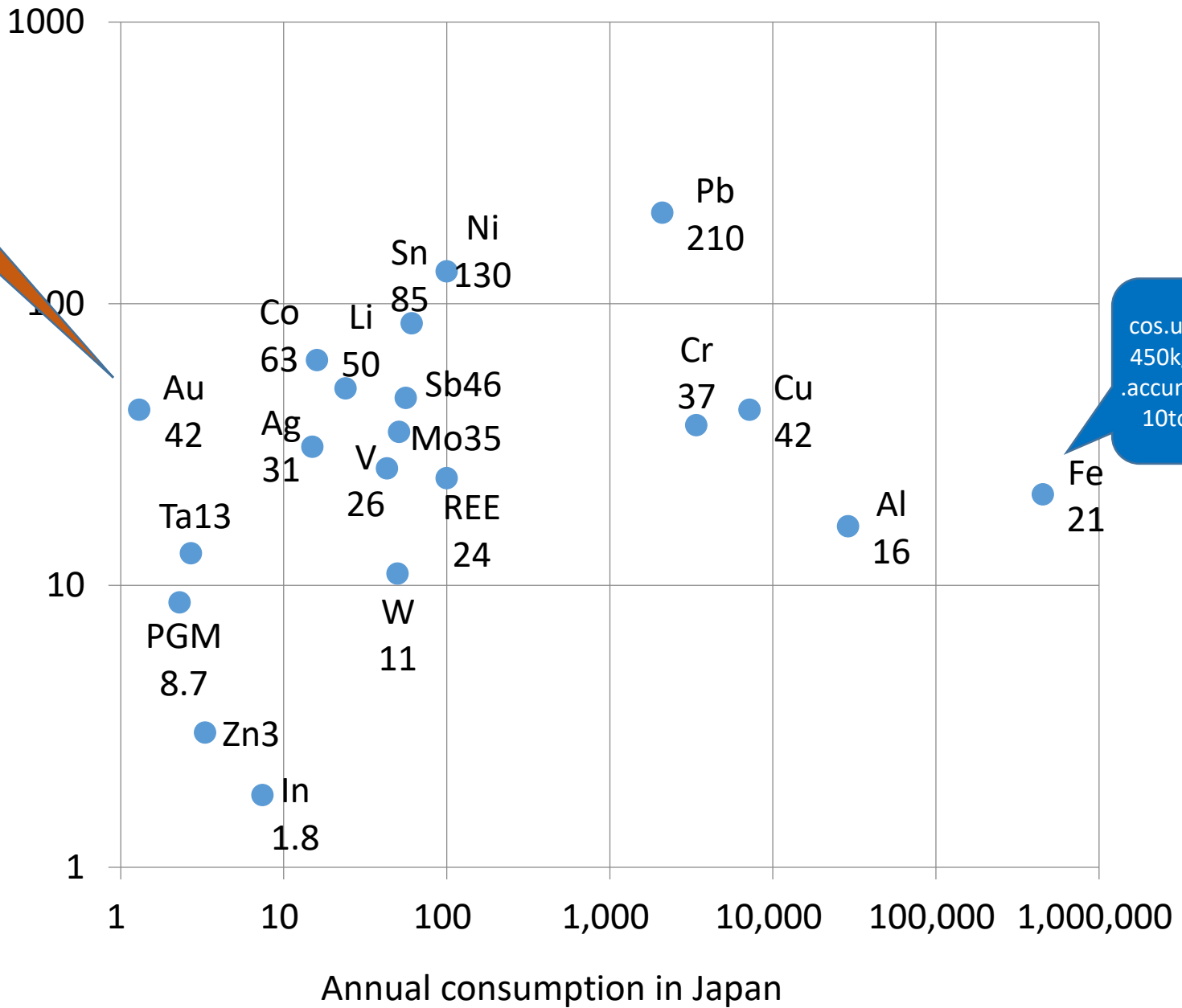
Accumulated consumption

Providable amount with reserves



Consumption
1.3g/y/capt
accumulation
60g/cpt

Proportion of accumulation to annual consumption

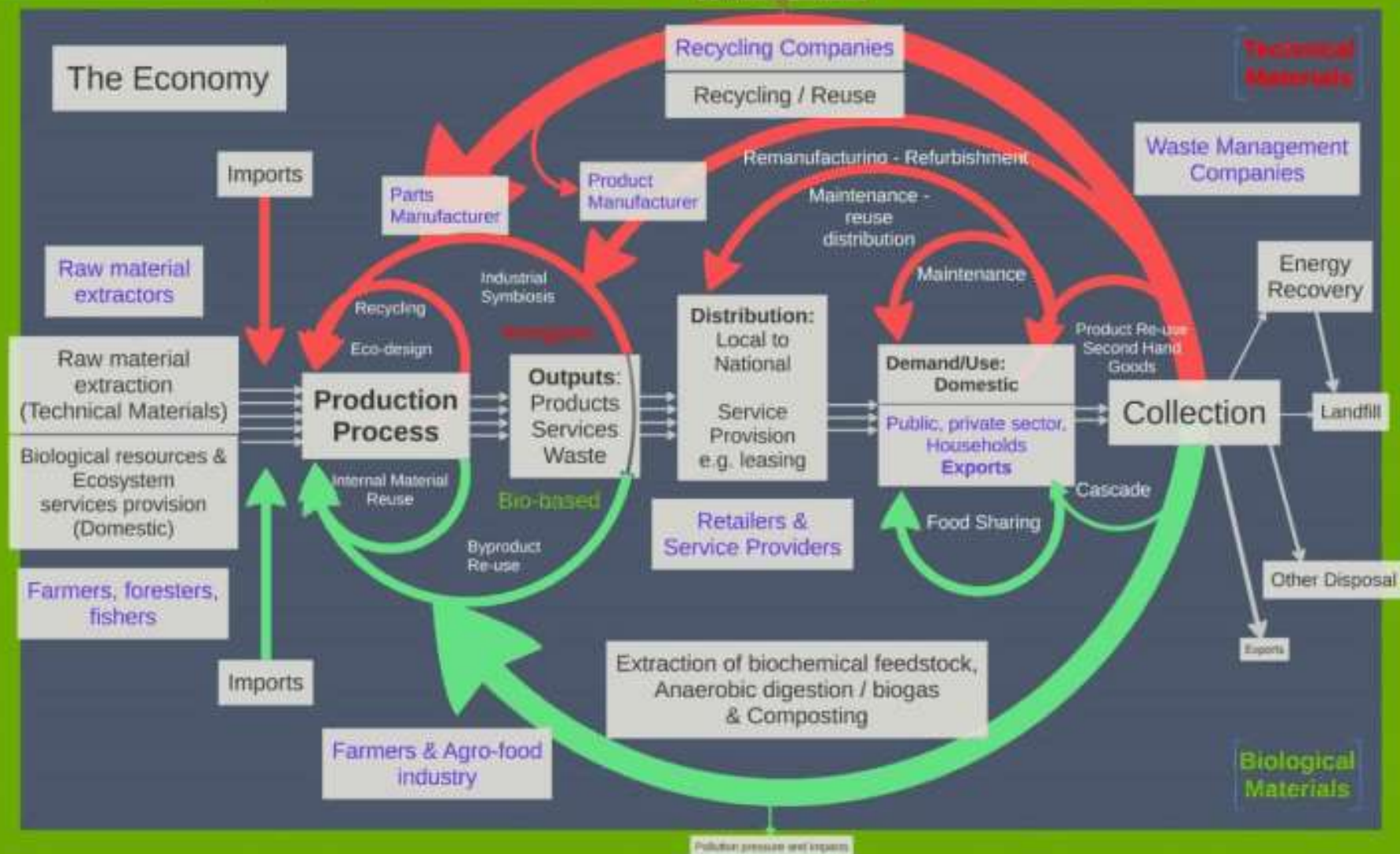


consumption
450kg/y/cpt
accumulation
10ton/cpt

Figure E2: Simplified illustration of a circular economy

Circular Economy is inevitable

The Environment



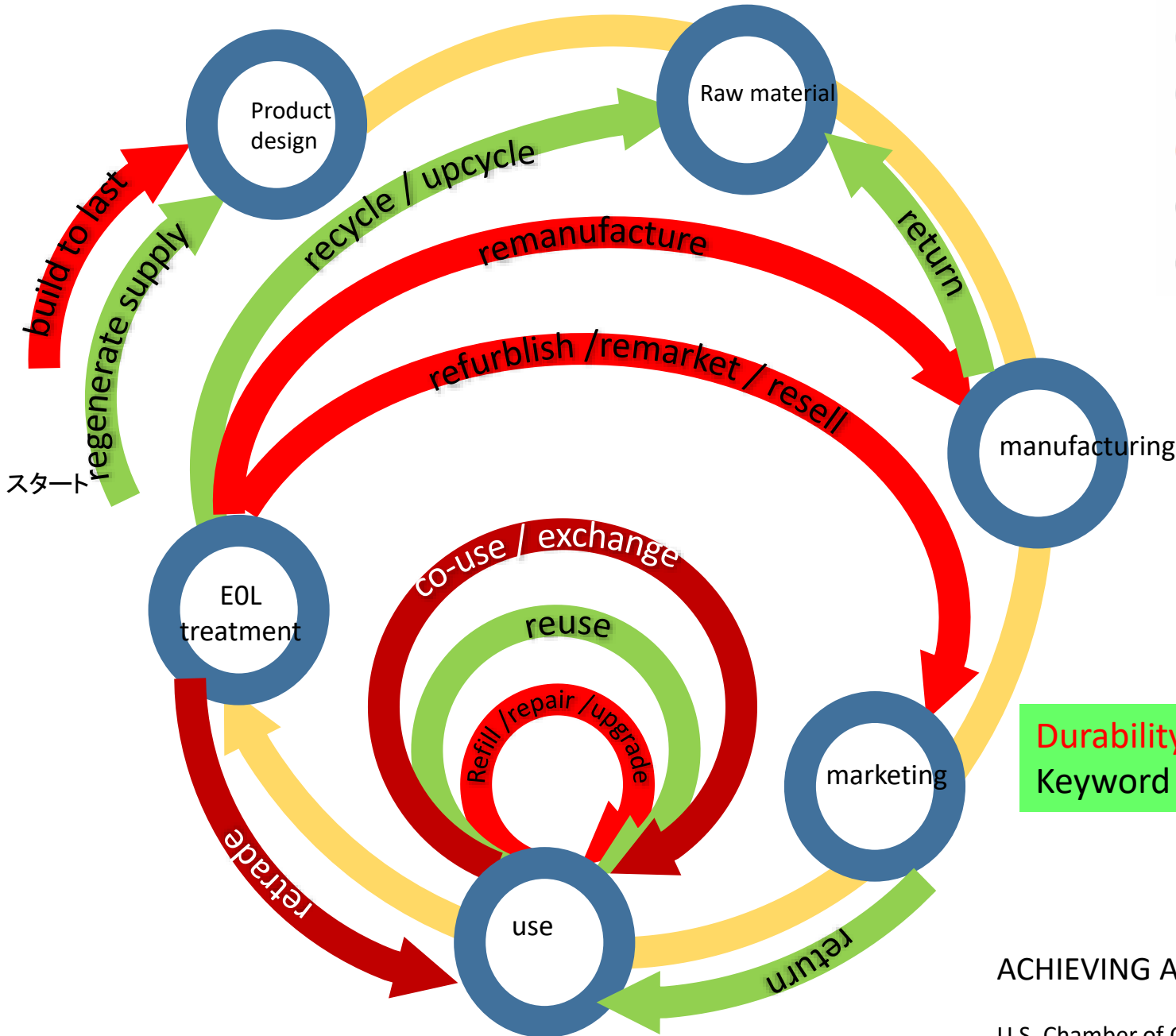
Source: Own representation, P ten Brink, P Razzini, S. Withana and E. van Dijk (IEEP), 2014

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BUSINESS MODELS

-  CIRCULAR SUPPLY-CHAIN
-  RECOVERY & RECYCLING
-  PRODUCT LIFE-EXTENSION
-  SHARING PLATFORM
-  PRODUCT AS A SERVICE



Durability becomes the greatest
Keyword of Ecodesign

ACHIEVING A CIRCULAR ECONOMY

U.S. Chamber of Commerce Foundation,
Supported by CCC's Circular Economy Network

Old Japanese people had practiced CE in their economy as **mottainai**.

Retained values were circulated in economy

肥溜汲み



Carrying night soil
For fertilizer



china repairman

焼き継屋

樽屋



recooper

Old reused
Straw slipper
store

わらじ塚



提灯屋



Lantern repairman



灰買い
Ash buyer for
pigmentation or
fertilizer

Umbrella
rib buyer



古骨買い

Old clothes
shop

古着屋



鏡研ぎ
Mirror sharpener



Resource Efficiency



decoupling



Platform for PAAS (Product As A Service)

Retained value

Communication value

Behavior value

Utility value

Value as Function unit

Value as Parts

Value as Material

Value as Resource

Shared space

IoE

ICT



Co-use

repair

Service share

???

direct Reuse



Repair

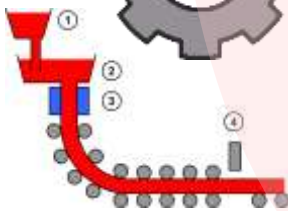
Parts

Re-manufacturing

Elements

Reuse/refurbish

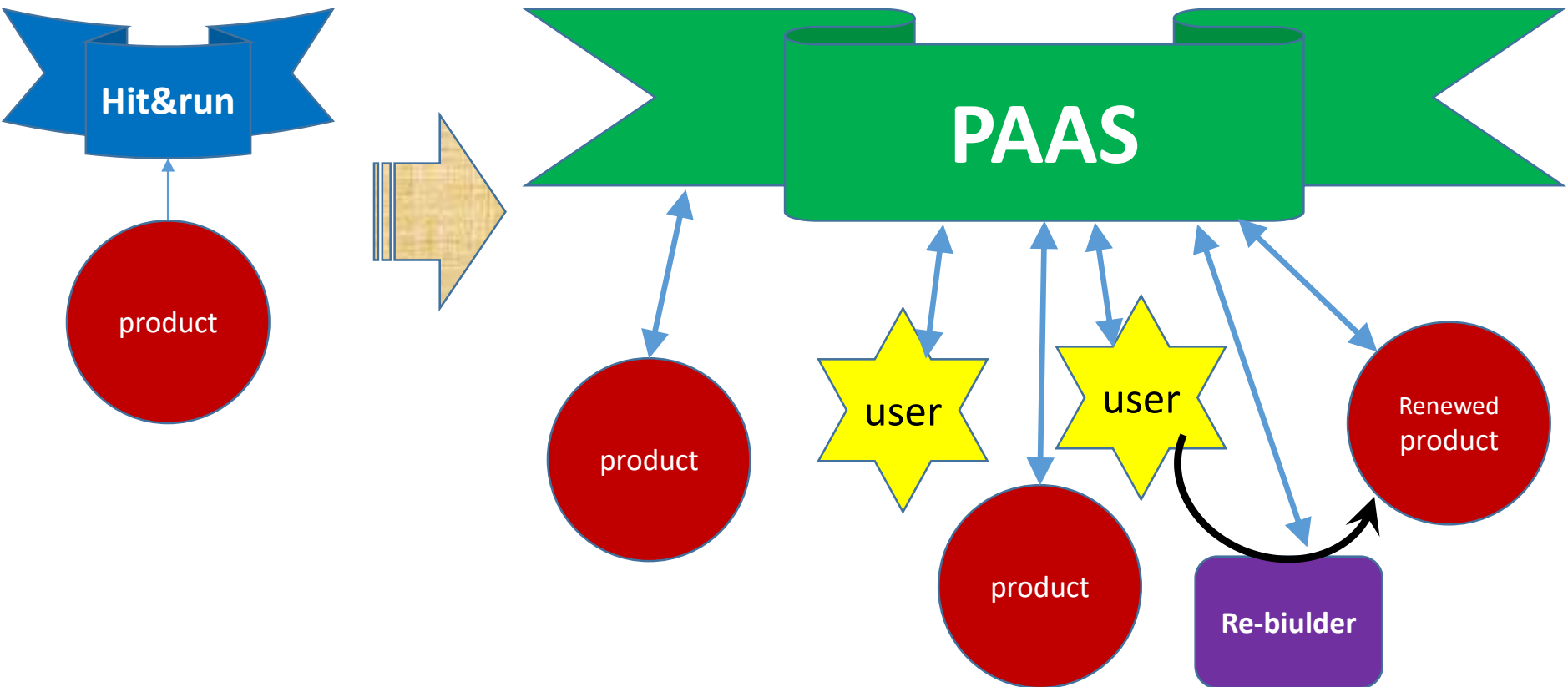
Substance-recycle



Drag out the retained value of a product throughly

Personal space

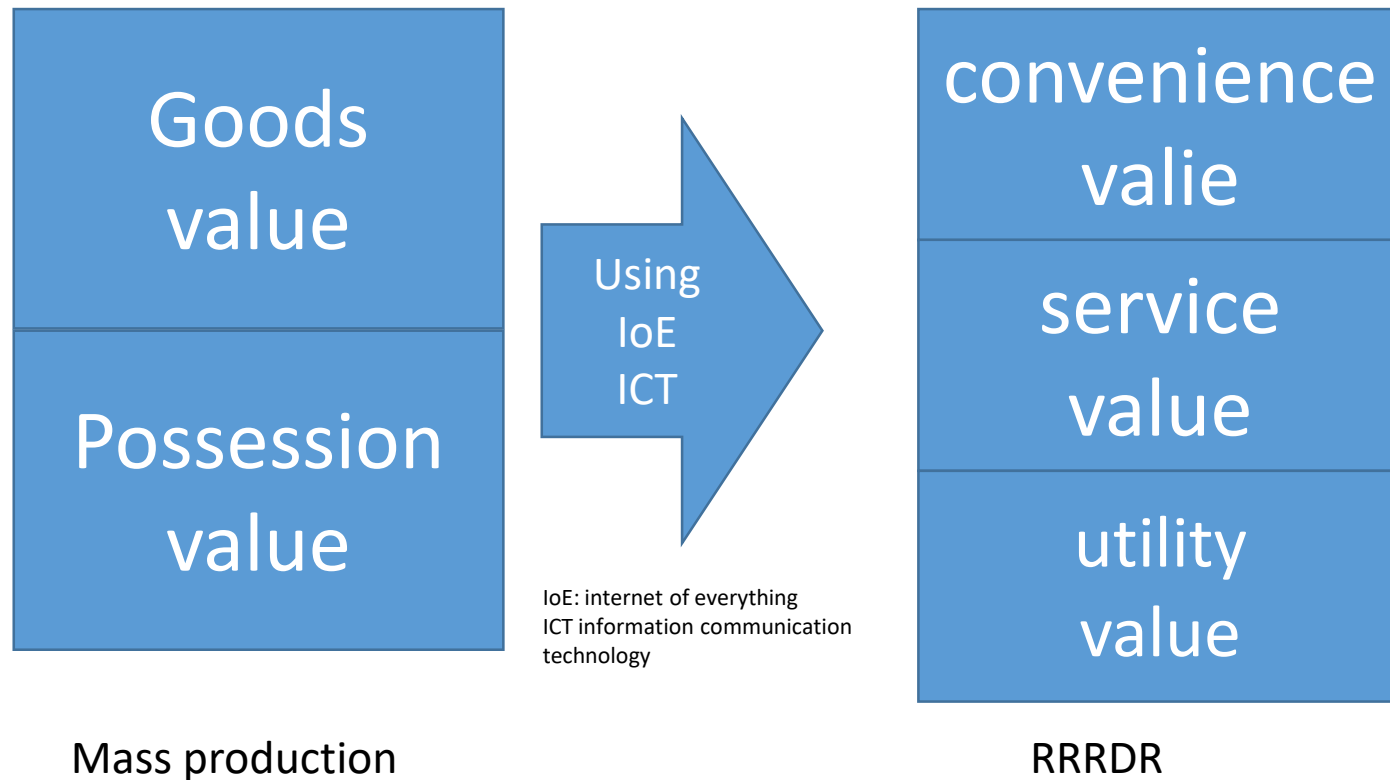
From Hit&run shift to PAAS(Product as a Service)



Monoモノ物

Kotoコト事

Entity-centered to Behavior-centered



Difference of Circular Economy(CE) from Japanese 循環型社会(3R)

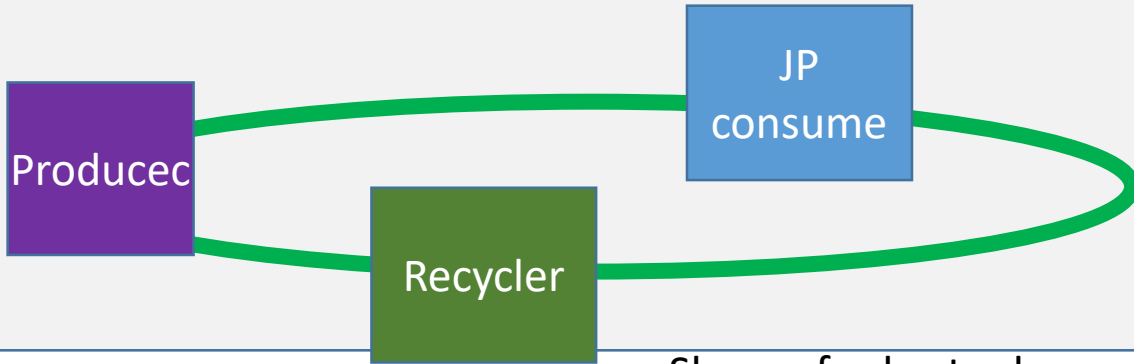
	3R	CE
aim	Reduction of final disposal (output oriented)	Improvement of Resource Efficiency (input oriented)
benefit	Reduction of extra economic burden of the society	Creation fo new business different from mas consumption
measure	Recovery of secondary raw material	Multiple utilization of EoL products
EoF products	Subjects to be recycled as raw material	Subjects to be used again.
Economic entity	Recyclers , mining company	Service suppliers, SME producers
motivation	Social responsibility	Add-value toward sustainability

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Different circulation society of EU from JP

Japanese circulation society

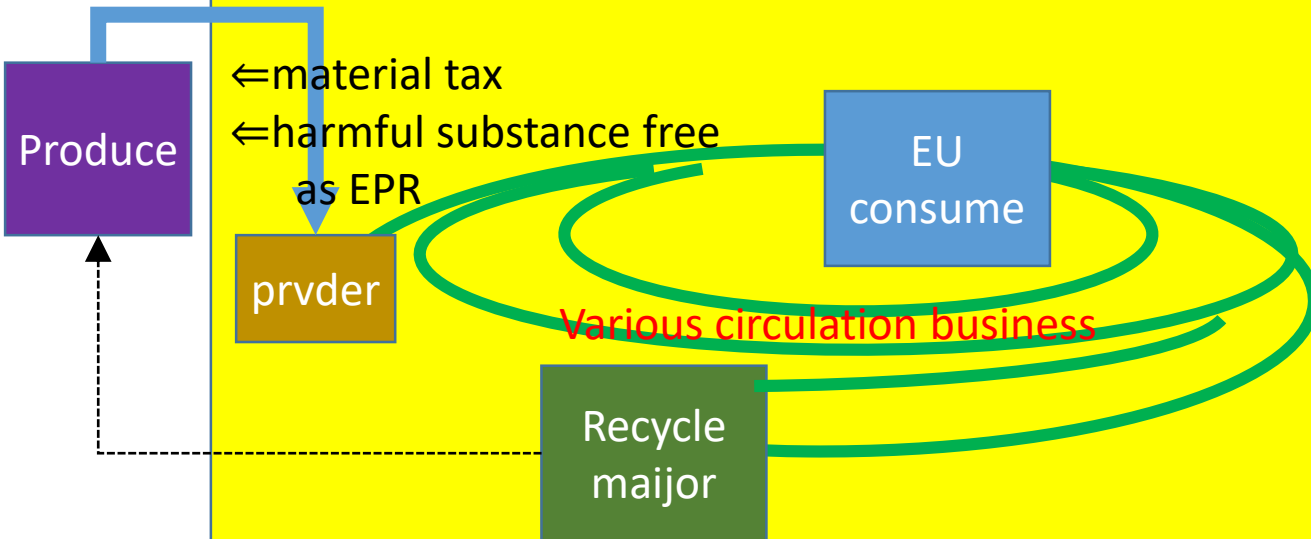


Arrange the outer ward of material circulation In the society

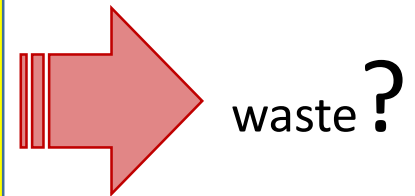
Zero emission
or
Low waste

Share of roles to decrease waste

EU's Circular Economy



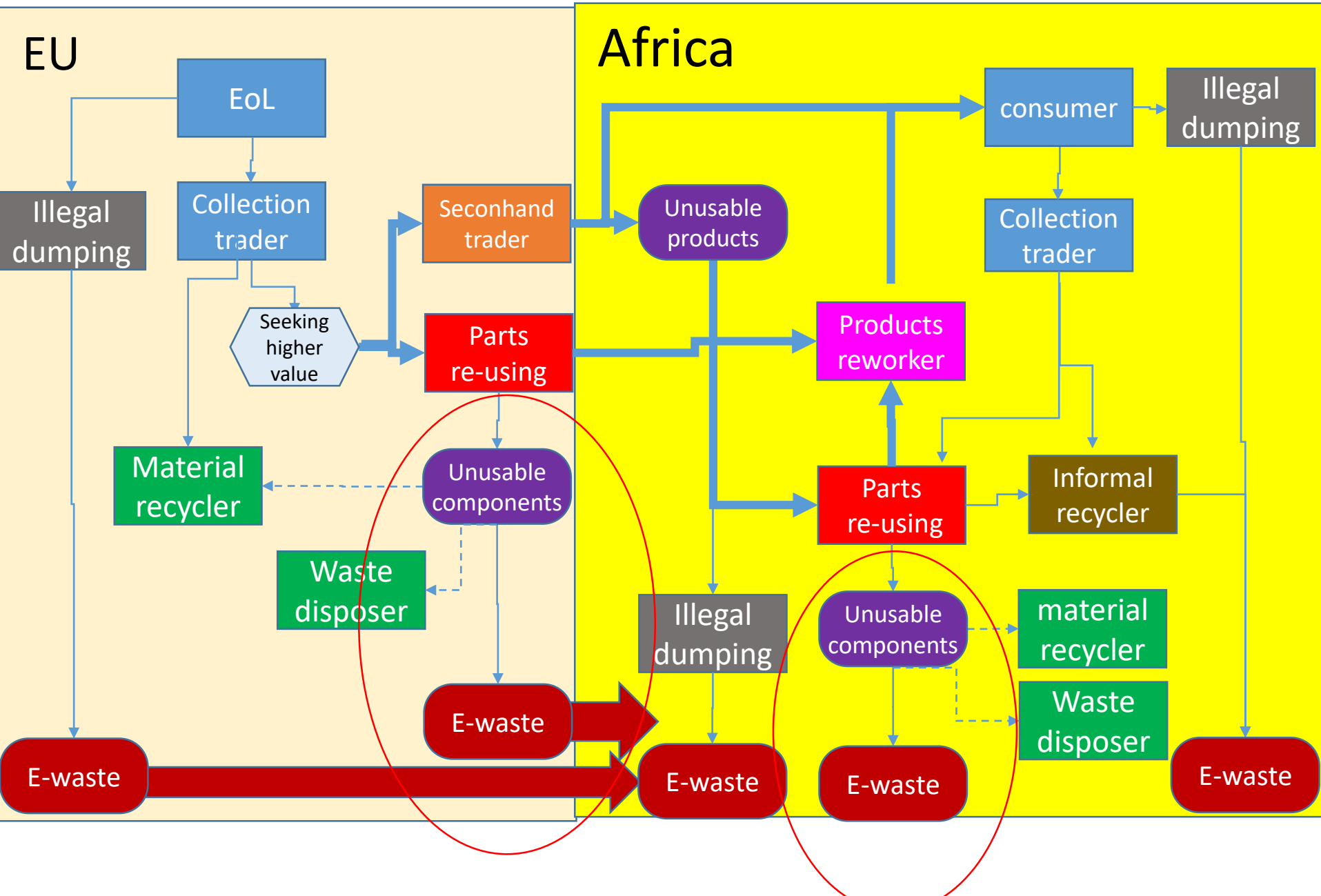
Create multiple inner route of goods circulation In the society



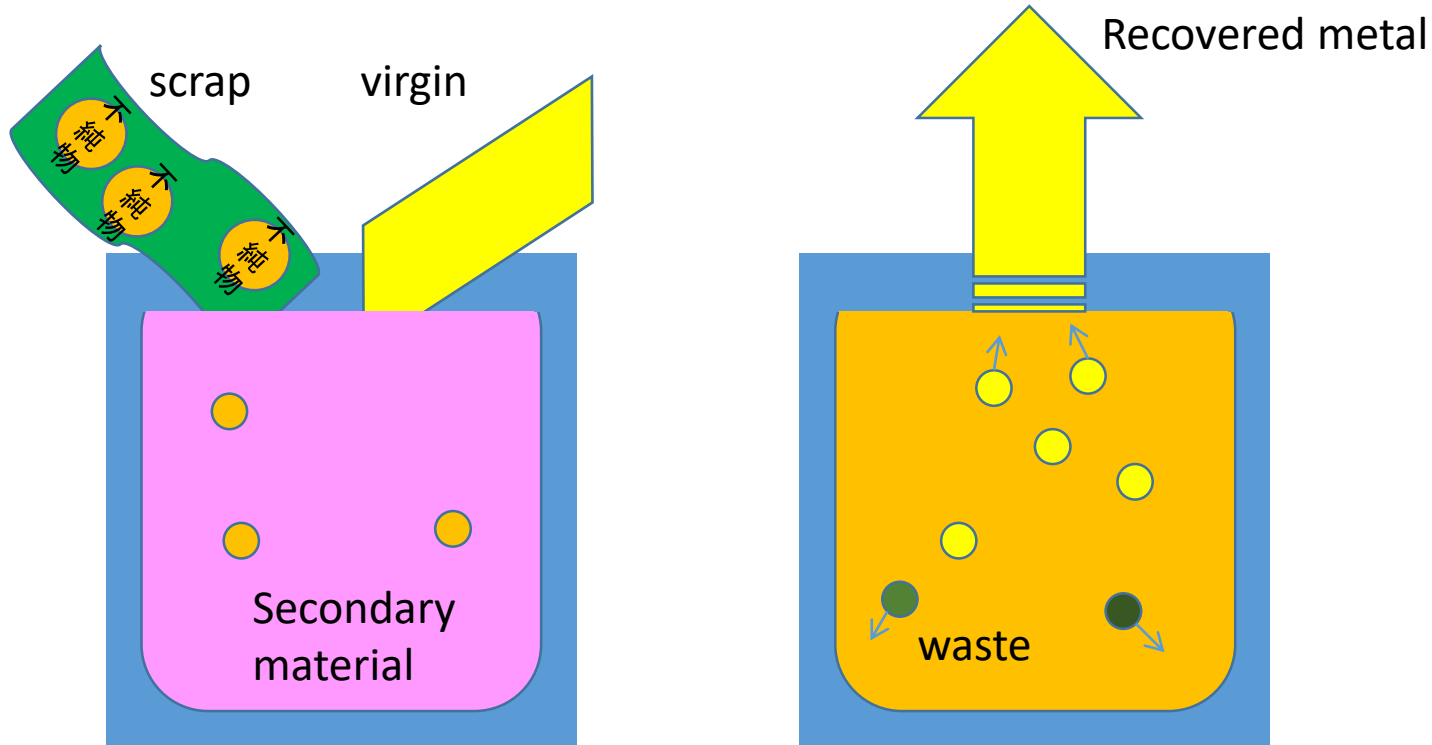
waste ?

Business chance in circulation from view point of sustainable consumption

Structure of the issue of E-waste



Two different types of recycling



Dilution-type

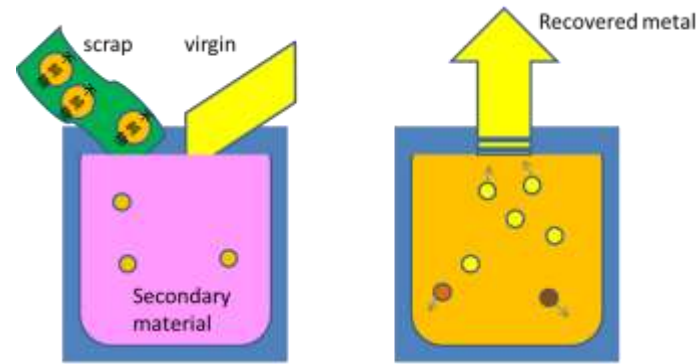
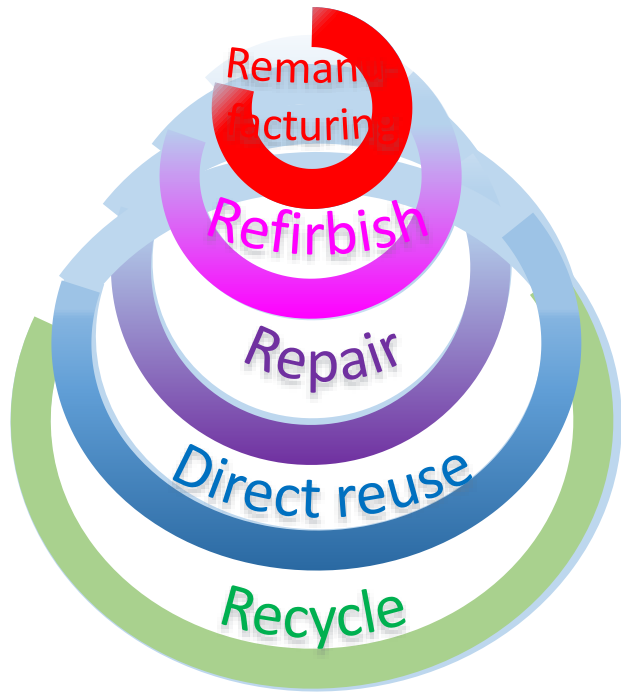
: Fe, Al, plastic, paper, glass

De-grading of material

Extraction-type

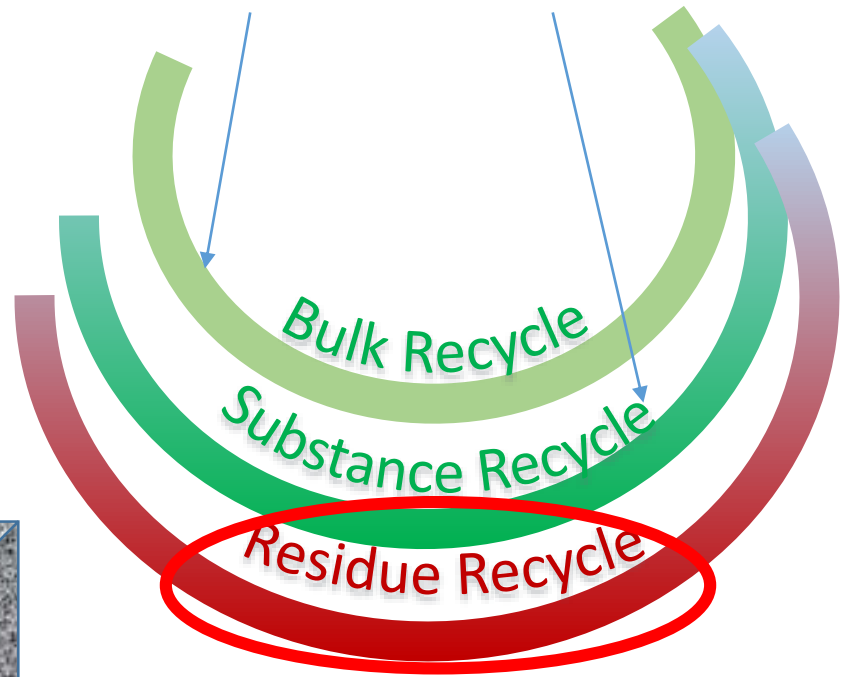
Rare metals, precious metals

much waste than obtained



Dilution-type
 : Fe,Al,plastic, paper, glass
De-grading of material

Extraction-type
 Rare metls, precious metals
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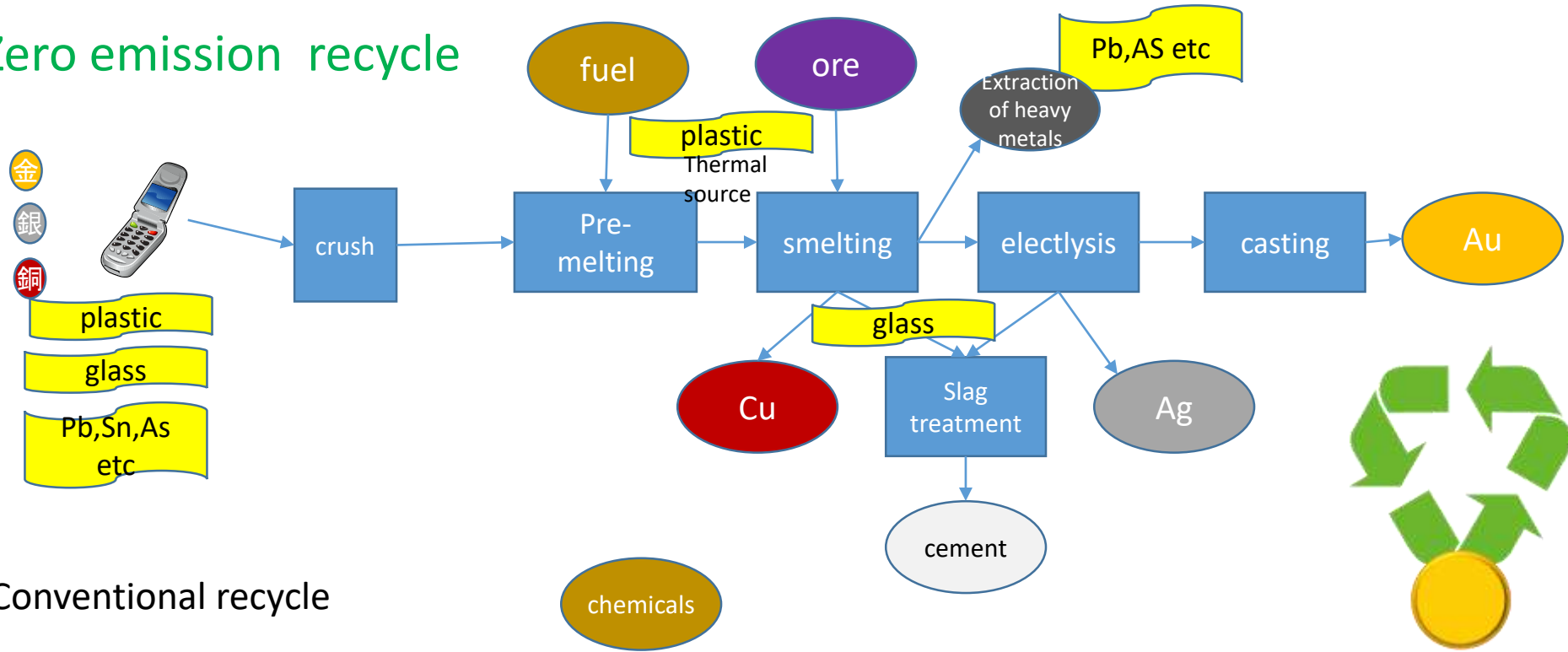
Recycle has three roles

Three 100%s of recycled medal

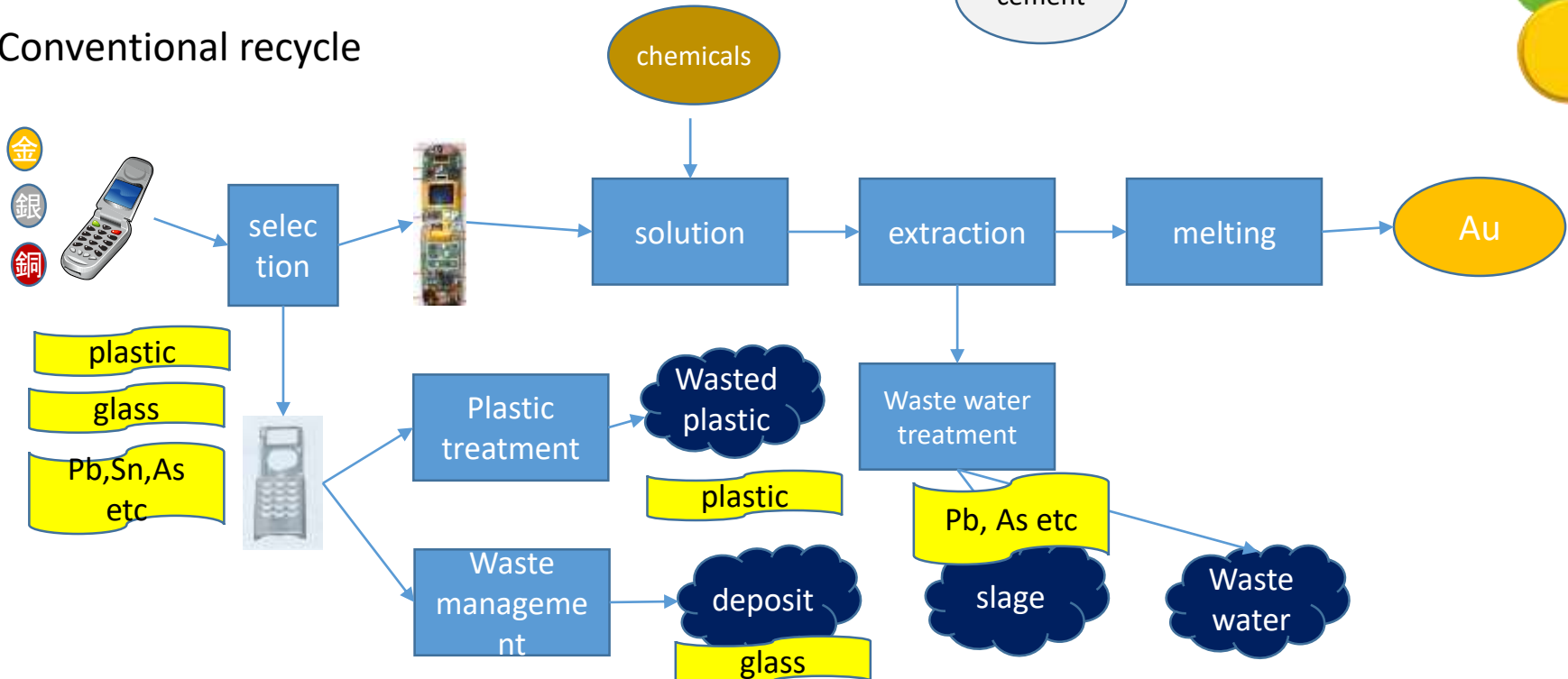


- **100% content**
all atoms in medal comes from recycling
- **100% collected**
collected material is enough to produce all medal
- **100% used**
collected material is fully used without waste

Zero emission recycle

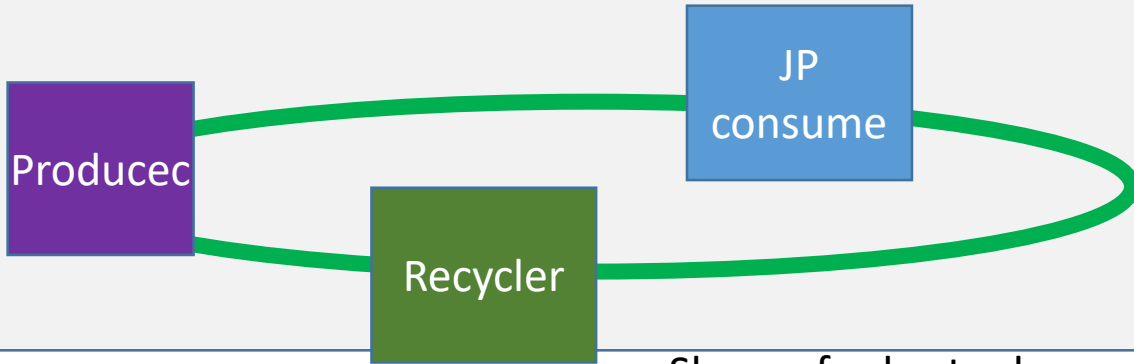


Conventional recycle



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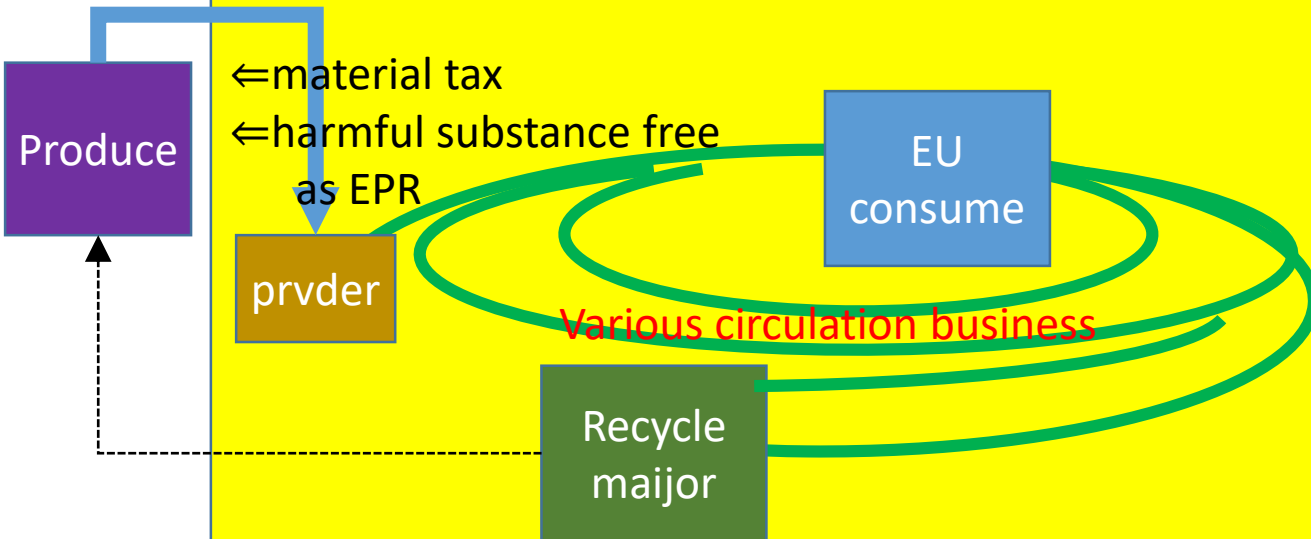


Arrange the outer ward of material circulation In the society

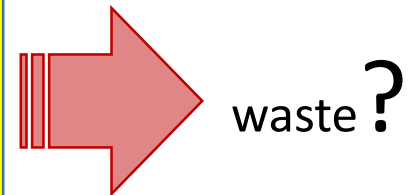
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Low waste

Share of roles to decrease waste

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Create multiple inner route of goods circulation In the society



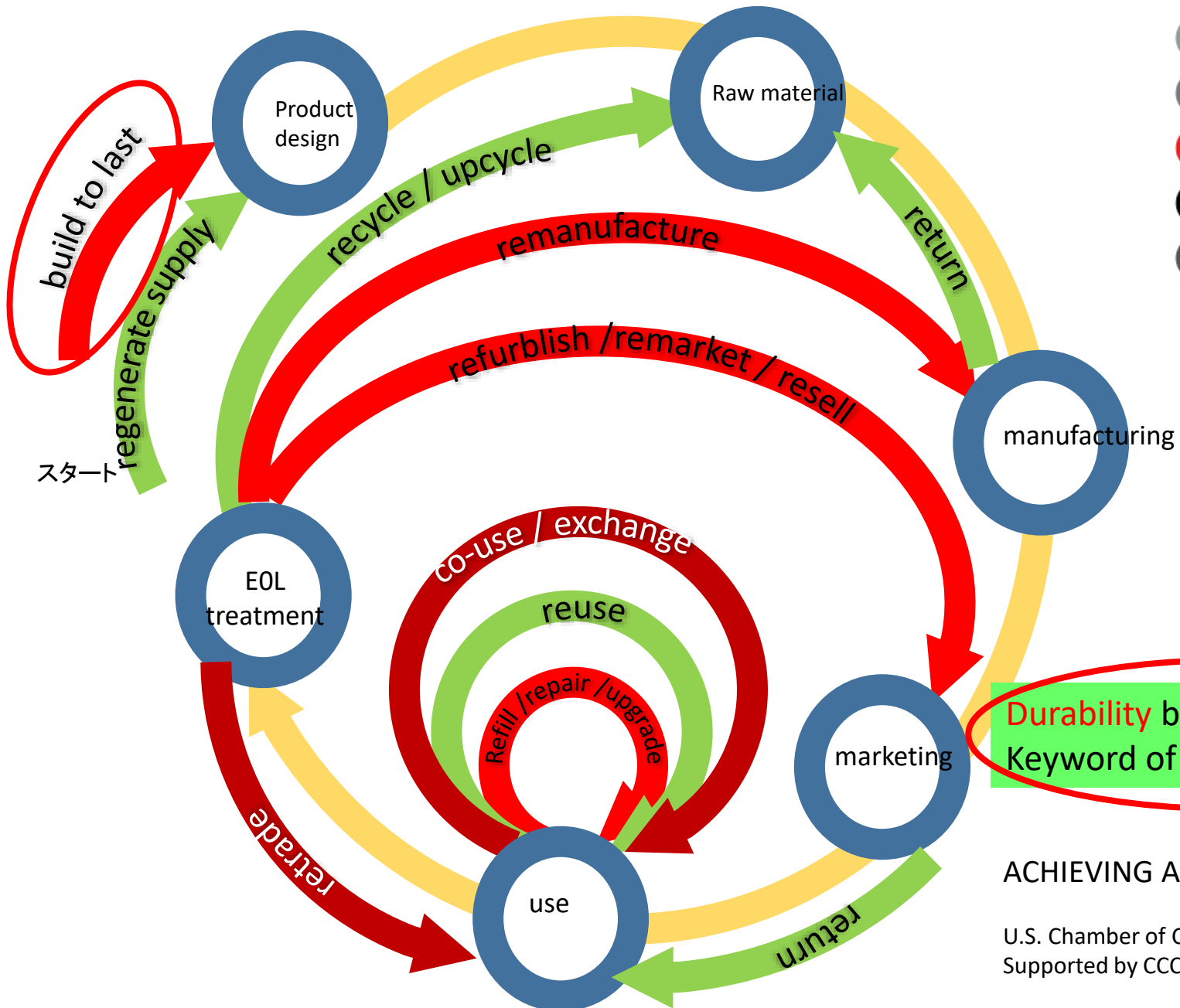
waste ?

Business chance in circulation from view point of sustainable consumption

How to give and certificate the durability and reliability is important.

BUSINESS MODELS

-  CIRCULAR SUPPLY-CHAIN
-  RECOVERY & RECYCLING
-  PRODUCT LIFE-EXTENSION
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-  PRODUCT AS A SERVICE



Durability becomes the greatest Keyword of Ecodesign

ACHIEVING A CIRCULAR ECONOMY

U.S. Chamber of Commerce Foundation, Supported by CCC's Circular Economy Network

Producer's brand

Producer's
cirtification

Re-
manu-
facturing

Blanded office machine
Rental ,Lease

Lilitted high-
level producer

Function confirmation
Life-time prediction

Technological
cirtification

What we
Need to do.

Vender
cirtification

What we
Can do.

refurbish

Third parties
Reconditioned machine

Huge number of Third parties

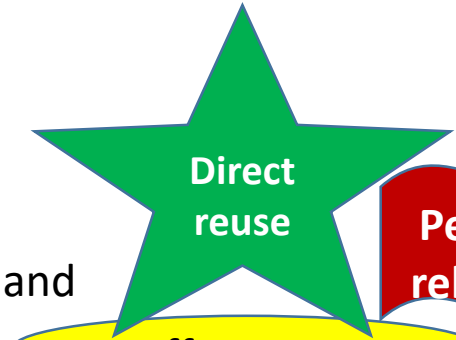
Direct
reuse

Second hand

Personal
reliability

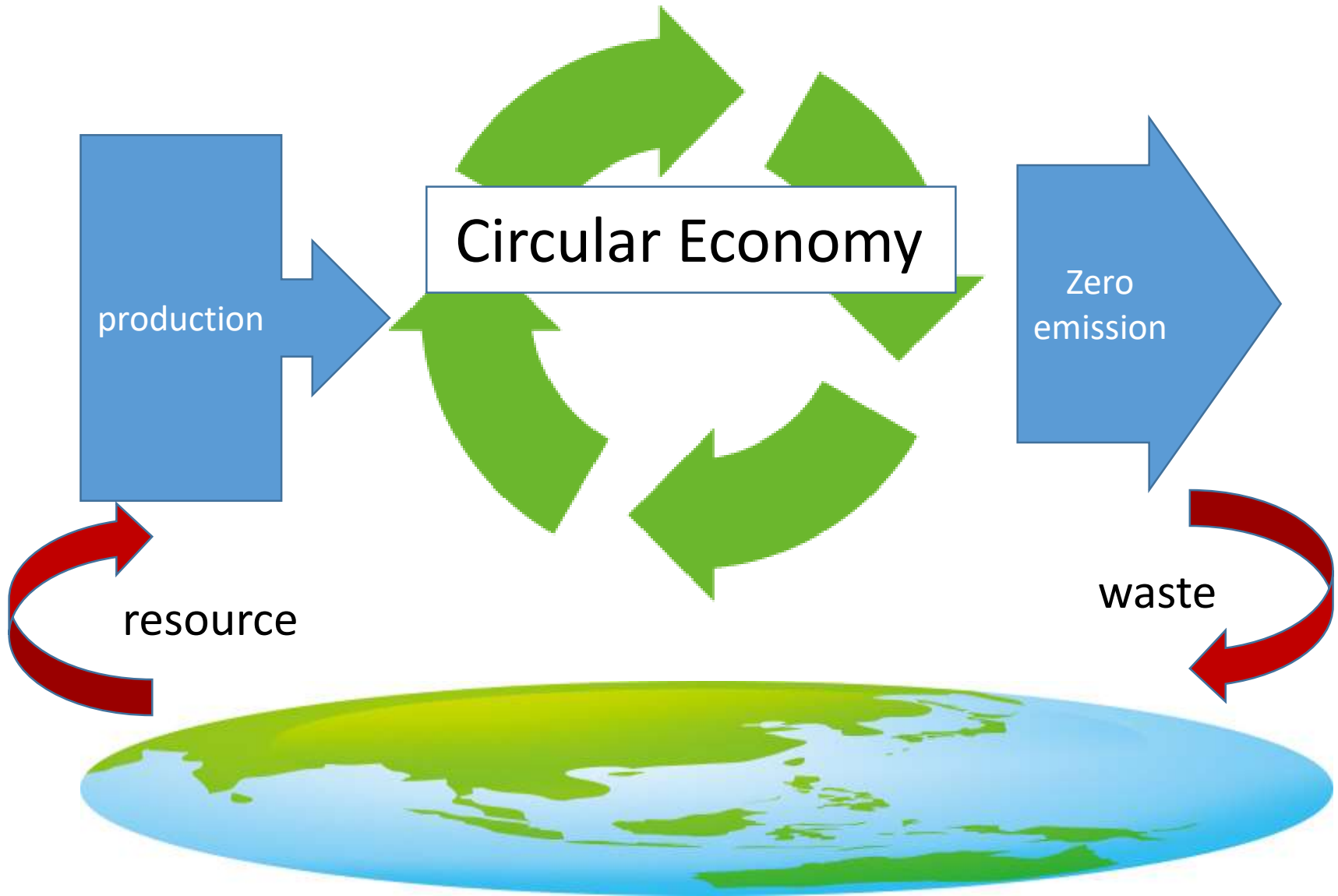
offerer

reliability



Total Life-cycle management with power of solution is required for the improvement of Resource Efficiency

Interface with eco-sphere may be considered less serious in CE.



Sustainable
society

Life style
Social system

Social mind

technology
science

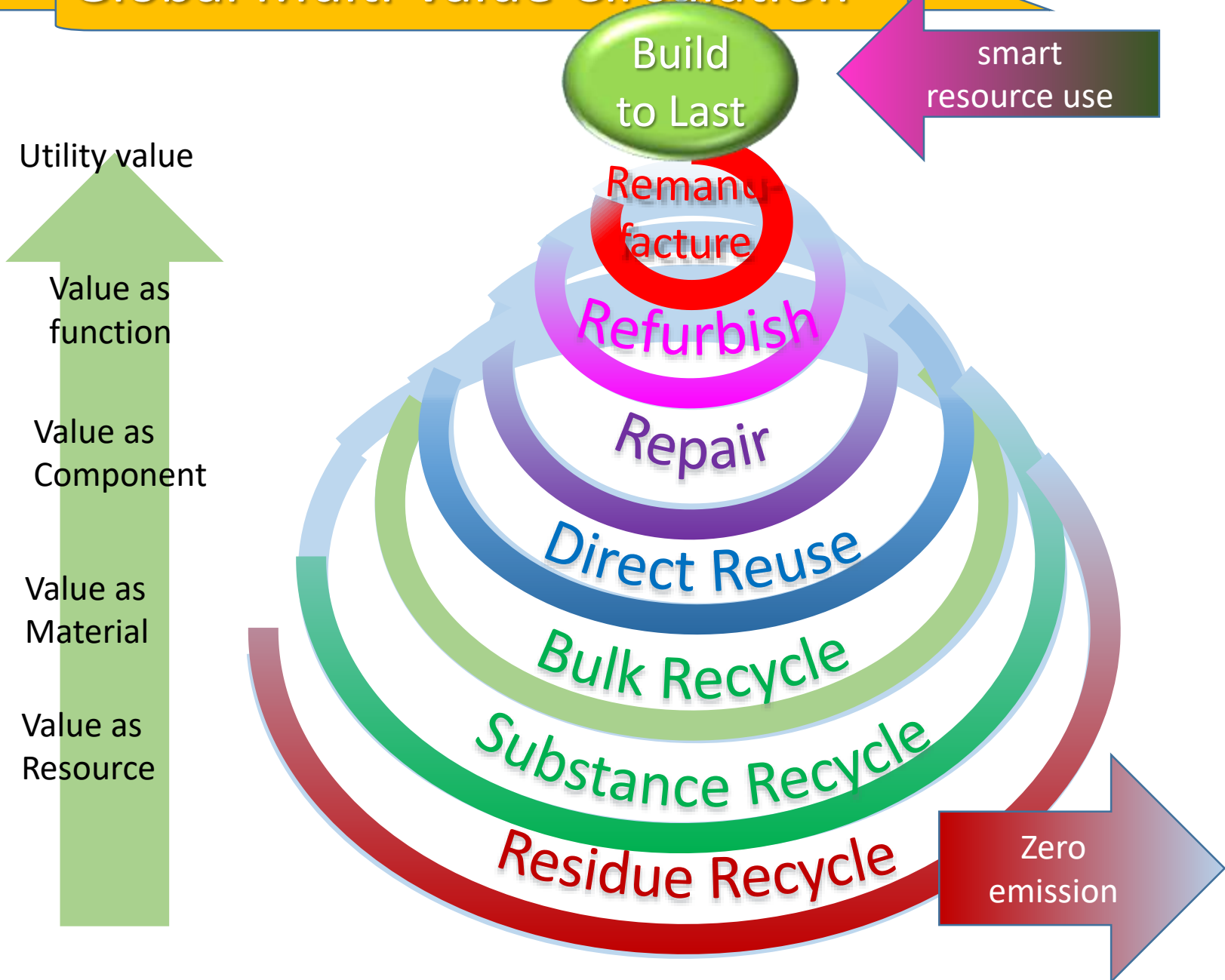
Physical base

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Global Multi-value Circulation

Beyond Circular Economy in EU



Japan Science & Technology Agency (JST) has started a new project

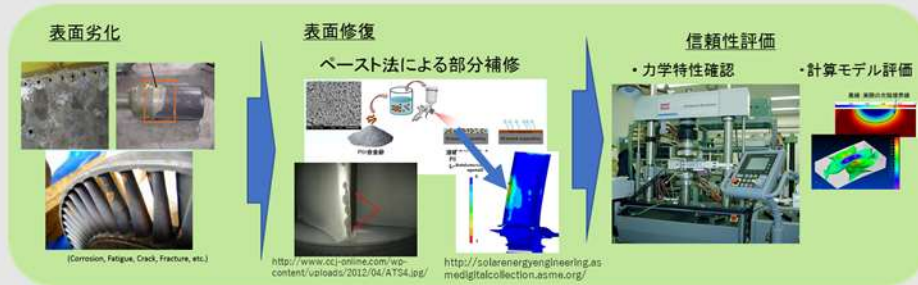
Mirai project "Realization of a Sustainable Society" area

Global Multi-value Circulation featured by Re-manufacturing

主要課題項目

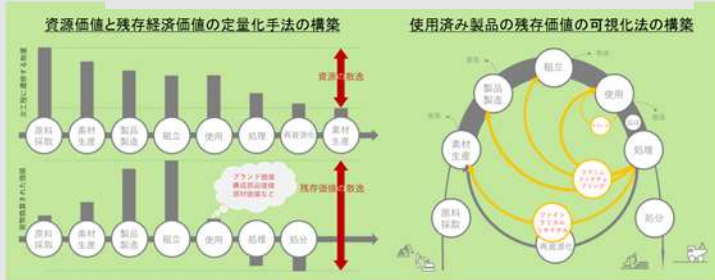
Surface remending and reliability evaluation

Process management of remanufacturing



Evaluation of retained value

Network creation among companies and academies



参画メンバー： 松本、増井、廣瀬、岩本、栗田、中住（産総研）、村上、早川（物材機構）、中島、南斉（国環研）、松野、吉村（千葉大）

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勿体無い

essence of material

loss

“cut blocks with a razor” ???

Ms Wangari Muta Maathai insisted

mottainai

物の本体を失する意

神仏などに対して不都合である。

過分のことで畏れ多い。

そのものの値打ちが生かされず
無駄になるのが惜しい。

① blaspheme against God and Ancestors

② awful to overmuch hospitality

③ spare material over-consumption

Don't waste the sprit of material which is given by God !

Mottainai Society

Sustainable
society

Life style
Social system

Social mind

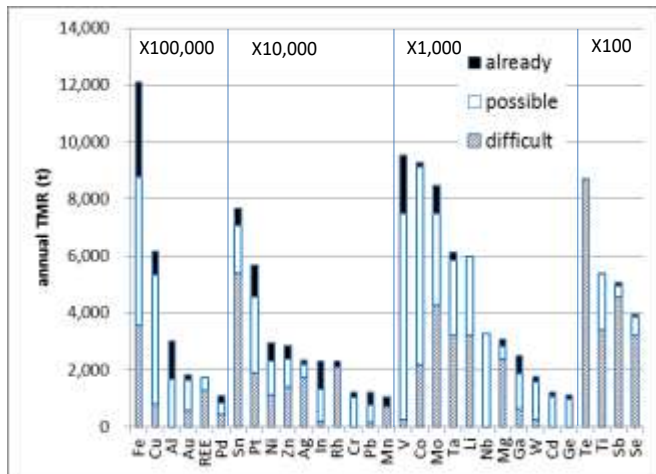
technolgy
science

Physical base

Resources & materials

Three Recommendations

- Technology-based Solutions and Certifications
- Zero Emission Circulation
- Metrics of resource efficiency



TMR
evaluation of
recycling

Let us make

Mottainai Society

globally together !