

A Circular Economy Framework Proposal for EV's Industry



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CGE in CIER

◆ Chung-Hua Institution for Economic Research (CIER)

- Established in 1981
- A think tank on the research of economics, mainly serving for Taiwanese government for the policy making and analysis

◆ Center for Green Economy (CGE)

- Established in 2013 under CIER
- Specialized in environmental economics, international trade and green policies.
- 222



Outline

- Circular Economy, how to circulate?
- Status and industries of circular economy in Taiwan
- Current Issues
- Strategies to linking circular economy with emerging green/low carbon solutions

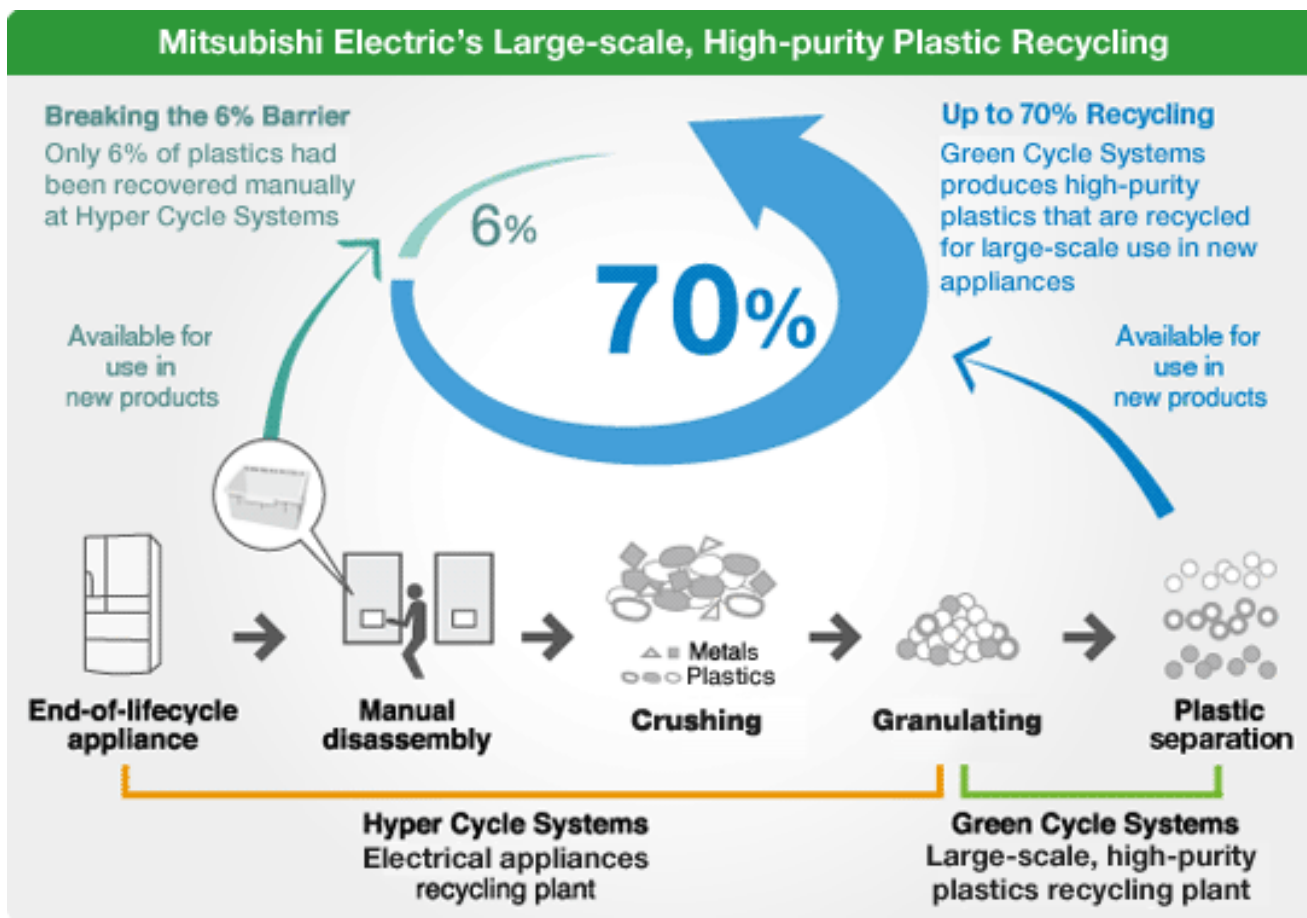


Circular Economy?

Concept of Circular Economy 1

A recycling oriented society

Ex. Basic Law for Establishing the Recycling-based Society
Japan, 2000



A Recycling and Reuse Oriented Manufacturing and Consumption Economy

OUTLINE OF A CIRCULAR ECONOMY

PRINCIPLE

1

Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows
ReSOLVE levers: regenerate, virtualise, exchange

PRINCIPLE

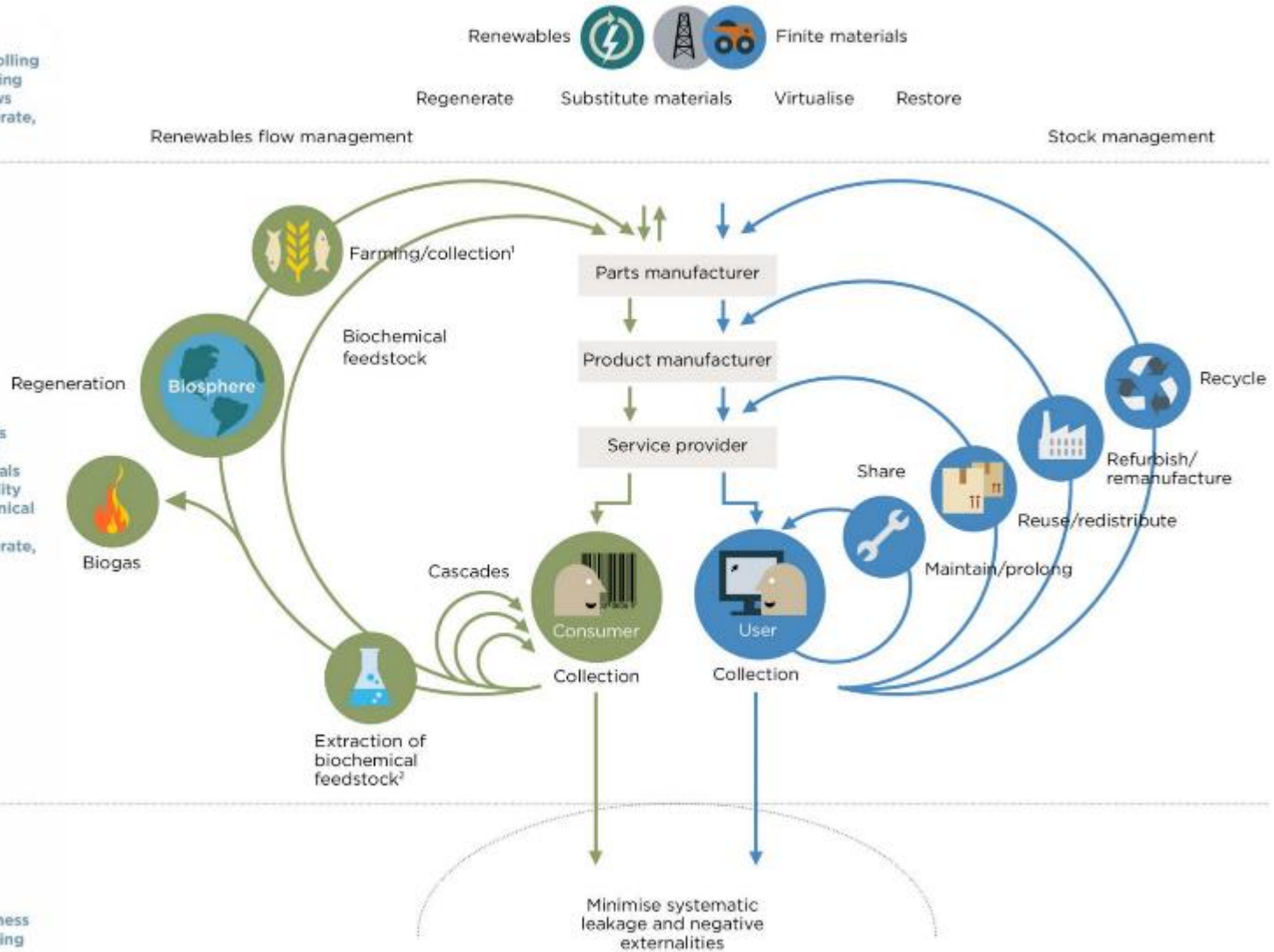
2

Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles
ReSOLVE levers: regenerate, share, optimise, loop

PRINCIPLE

3

Foster system effectiveness by revealing and designing out negative externalities
All ReSOLVE levers

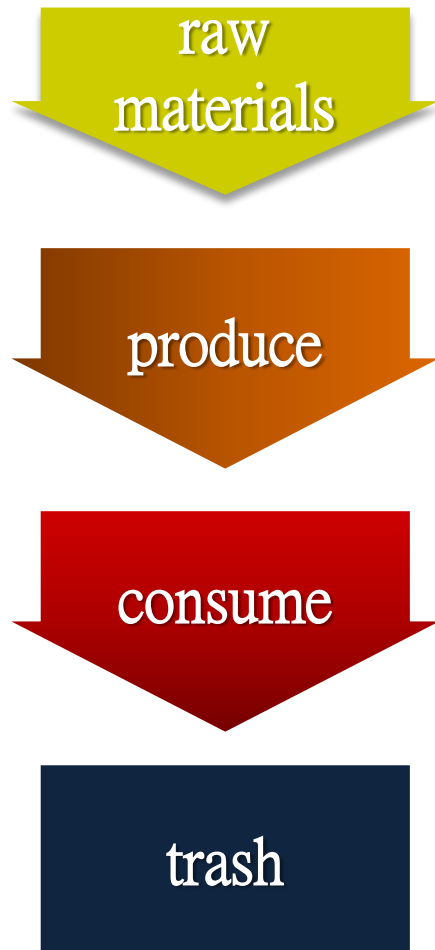


¹ Hunting and fishing

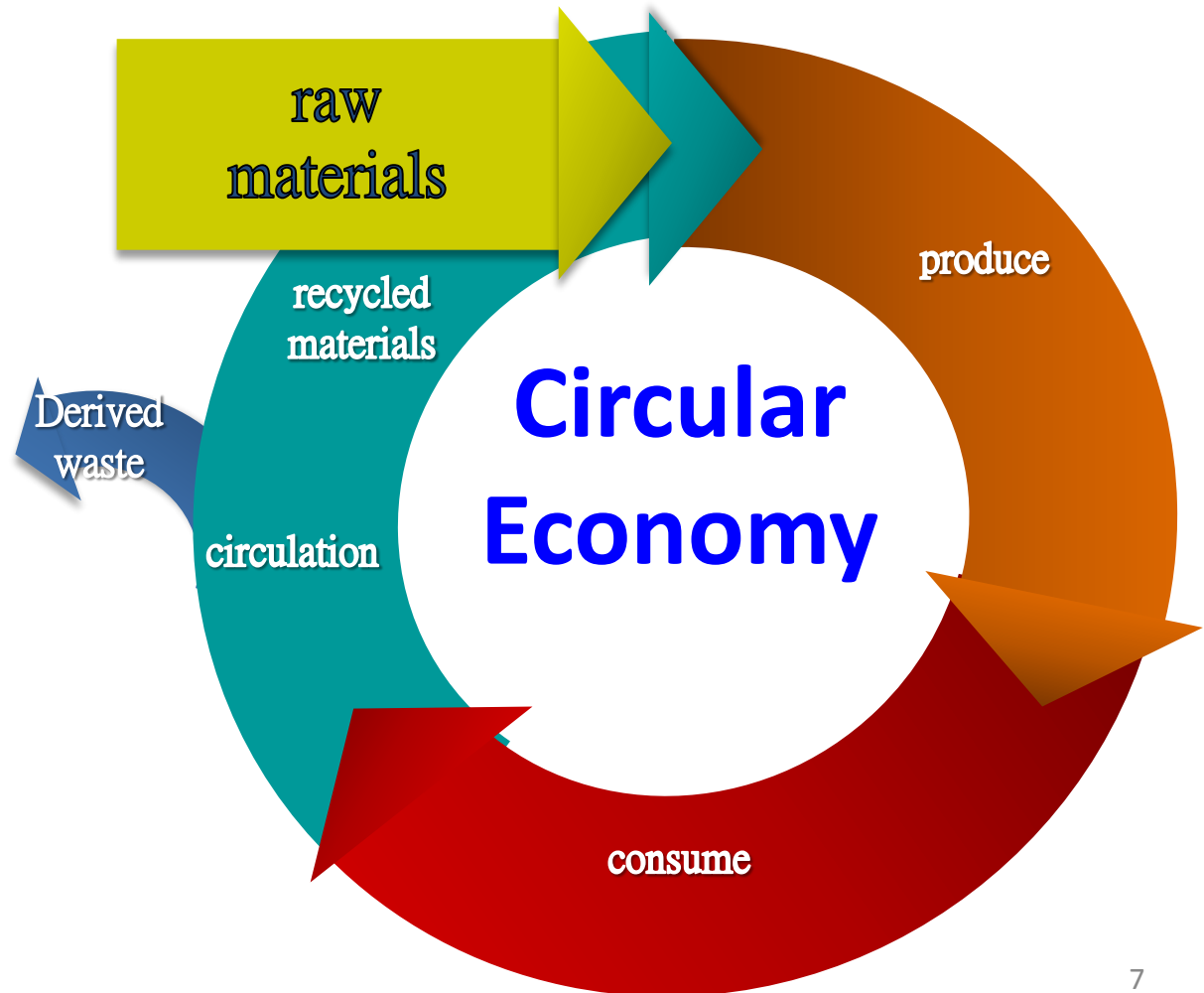
² Can take both post-harvest and post-consumer waste as an input

Circular vs. Linear Economy

Linear Economy

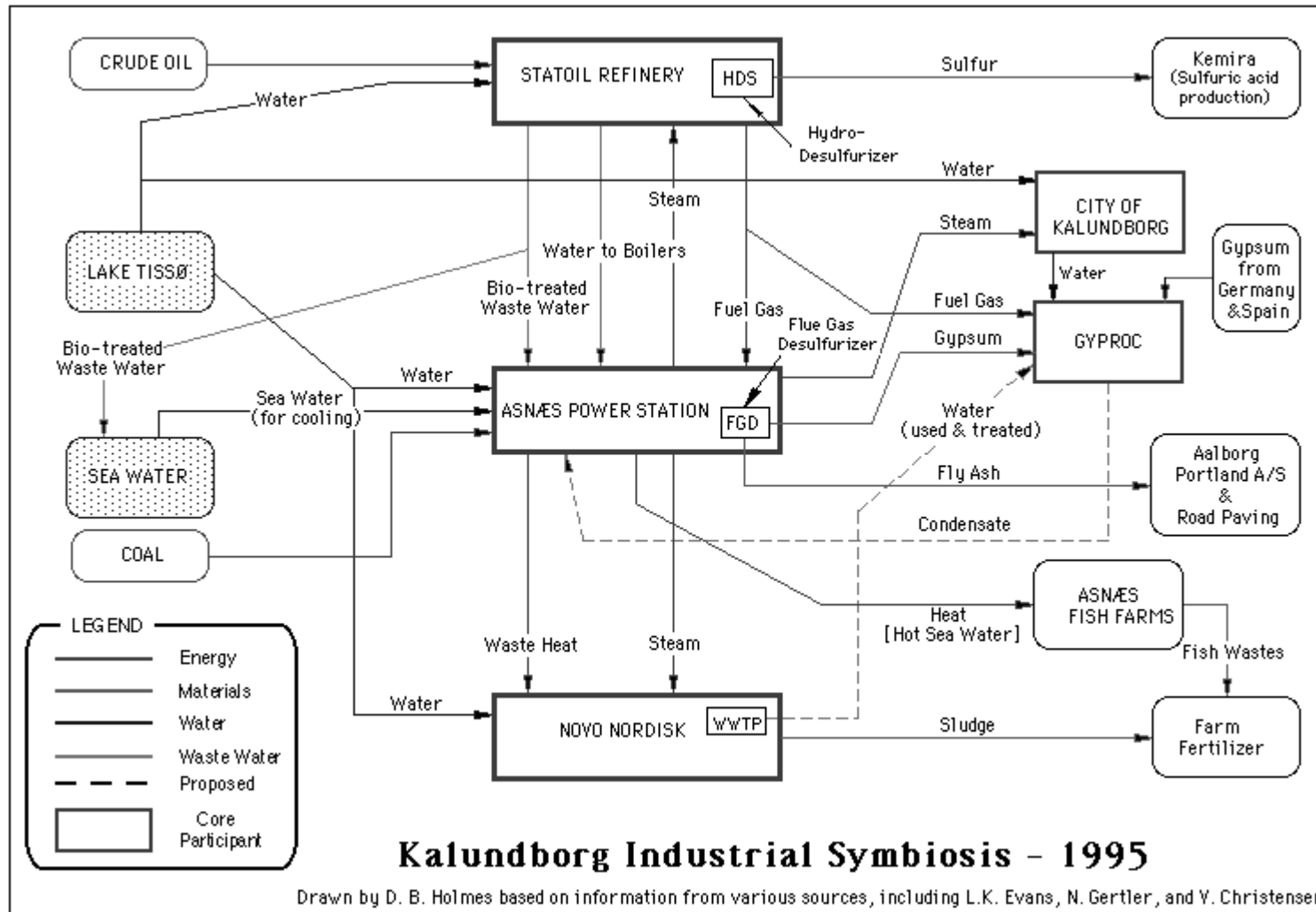


Circular Economy



Concept of Circular Economy 2

Kalunborg Symbiosis, Denmark





Concept of Circular Economy 3

Green Economy and Green Growth



The term 'Green Economy' first appeared in a pioneering 1989 report for the Government of the United Kingdom by a group of environmental economists, led by Professor David W. Pearce.

1989

1990

1991

The authors released sequels to the first report in 1991. The sequels extended to the problems of the global economy, including climate change and ozone depletion.



Green Economy and Green Growth



The term 'Green Economy' was revived and was viewed as a response to multiple global crises. The UNEP championed the idea of 'green stimulus packages' and identified specific areas where large-scale public investment could kick-start a 'green economy'.

2008

2009



Ministers and Heads of Delegation of the UNEP Global Ministerial Environment Forum acknowledged that the green economy concept 'can significantly address current challenges and deliver economic development opportunities and multiple benefits for all nations.'

2010

2011



In Oct. 2008, the UNEP launched its Green Economy Initiative to provide analysis and policy support for investment in green sectors and for greening environmentally unfriendly sectors.



The term 'Green Economy Report' was firstly defined by the UNEP. 'Green Economy' is the one that results in 'improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.'



Status of Taiwan in Circular Economy

Recycling Management Policy

Waste Disposal Act (WDA)

Resource Recycling Act (RRA)

Market-driven recycling only

Producers were responsible for recycling physically and financially

Producers pay recycling fees to eight recycling funds

The eight recycling funds are administered by EPAT's Recycling Fund Management Board

1984

1987

1990

1997

1999

2002

2003

2004

2005

2007

2010

Garbage open dump

MSW policy initiated - landfill

"Polluter Pays Principle" introduced

MSW policy adjusted – shift to Incineration

Four-in-one Recycling Program

Waste Household appliances collection and Storage

Waste Home appliances recycling enterprise setup

Source reduction restriction of Plastic Shopping Bags and Disposable Tableware

Resource Recycling Act initiated

Prospects and evaluation on MSW treatment program
•Resource regeneration and reuse
•Zero waste

Zero waste policy

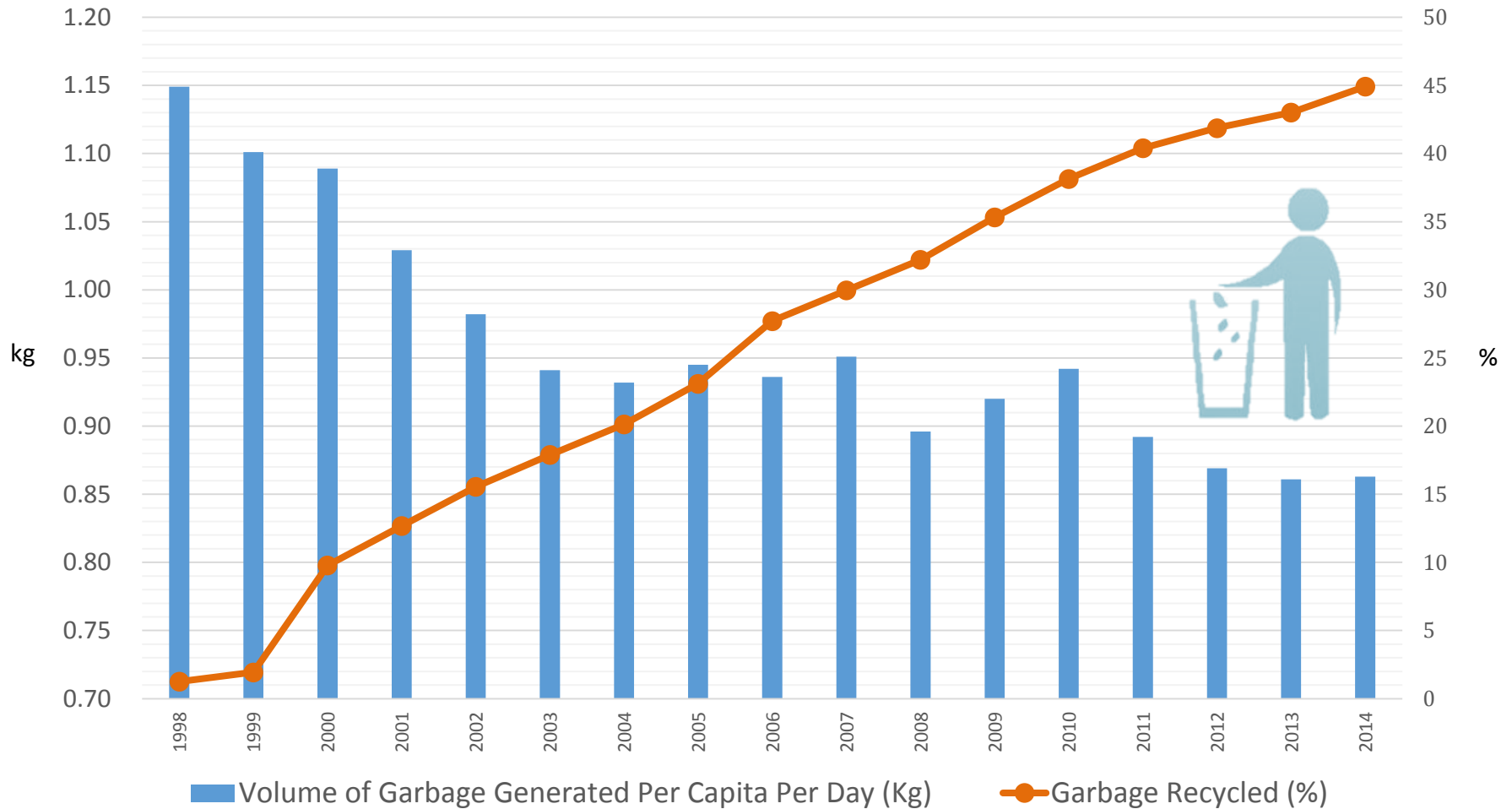
Mandatory garbage sorting – keep trash off the ground

Resource recycling promotion plan for general waste

•Construct Biomass-energy Center
•Reactivate landfill site

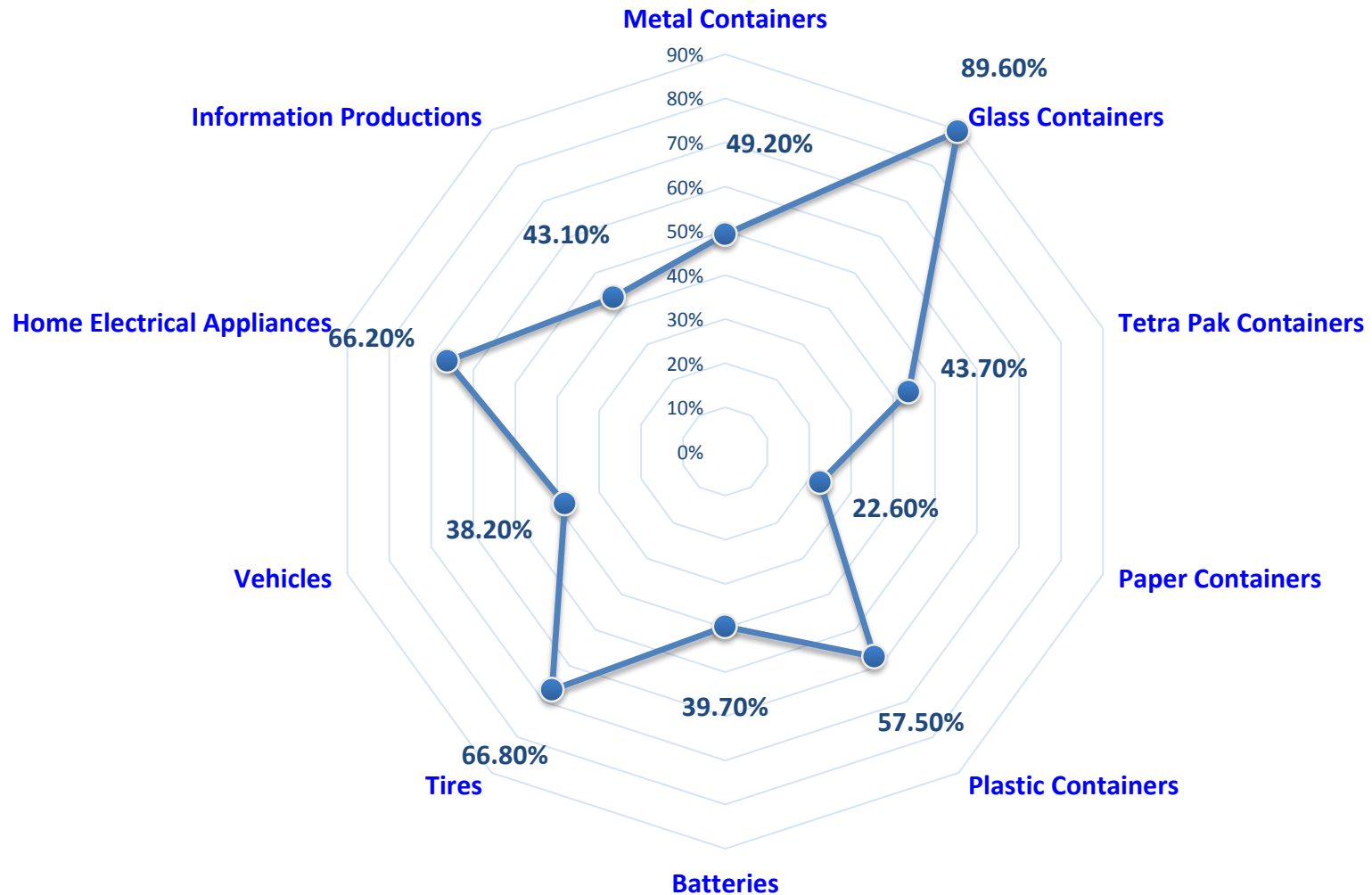
SEA for waste treatment

Garbage Generated & Recycled



Source: Yearbook of Environmental Protection Statistics, Taiwan, 2015

Recycling Rate for Selected Products





The Industries of Circular Economy In Taiwan

Shirts made with recycled PET bottles

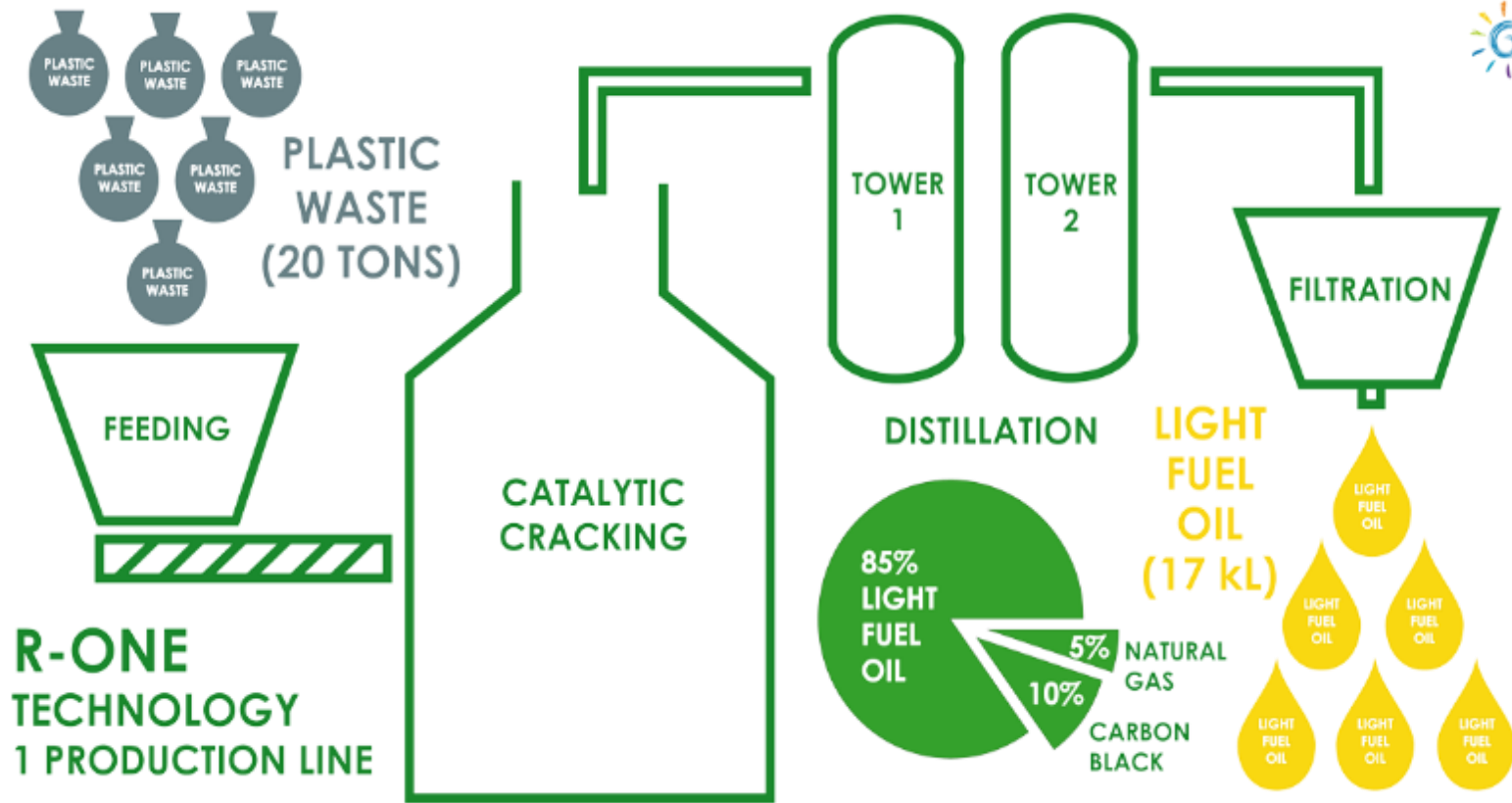


Source: <http://www.soccerbox.com/blog/how-nike-manufacture-football-jerseys-from-recycled-bottles/>

Blanket or Scarf made with recycled PET bottles



Fuel made from recycled plastic waste



Glass Stones for walls and floors



Trendy stools designed with recycled rubber tires



Elastic Grass Brick considering both water-retaining and security from slipping



Energy bricks made from recycled LCD fragments and cement



Spring Pool Glass Industrial Corp.

- Energy-saving bricks, made from recycled LCD fragments and cement, can withstand temperatures of up to 600 degrees. These bricks also offer excellent soundproofing and are only a fifth of the weight of conventional bricks.

Precious and Rare Metal Refinement



**Solar Applied Materials
Technology Corp.**

- Taiwan largest precious material refiner (market share 60%)
- To dilute the waste material to metal by a recycling refinery platform.



Issues and Strategies in promoting Circular Economy

Incomplete Circular Economy

- Lack of appropriate recycling schemes and technology for green and low carbon products after their retirement
 - Solar photovoltaic modules
 - EVs
- Emphasis on collection and treatment more than value-added recycling operation
 - Down-cycling vs. Up-cycling
 - Cradle-to-Cradle practice not or scarcely existing

Strategy 1: cluster-based approach



Principles and Goals

Manufacturing-Recycling-Financing Alliances

- CGE/CIER as a platform for *domestic, regional and international* alliances
 - *Taiwan Green Economy Network*
- Inventory analysis for recycling technologies and capacity building
- Business model study and implementation
 - *Global cradle-to-cradle services for new technology, such as EVs*
- Certification and verification systems
 - *Secondary materials standards, reuse percentage etc.*
- Global partnership in technology, marketing and finance
- **Public-Private Partnership**

Strategy 2: indicator systems

- Indicators for reviewing the performance of circular economy at different levels: country, regional, city, enterprise.
- Indicators to encourage circular manufacturing practices
 - Promotion of use of secondary materials
 - Increase the value-added from circular economy



Performance Indicators

- **Resource Recovery Rate**

= Collection Rate X Recycling Rate X Cyclical Use Rate

- **collection rate** : waste taken back / waste generated
- **recycling rate** : secondary materials generated / waste taken back
- **cyclical use rate** : secondary materials used/ (secondary materials used + virgin materials used)

- **Production Value Per Unit of Waste Taken Back**

= Production Value of Recycling Industry / Waste Taken back



Indicators in Manufacturing

- **Material Use Efficiency**
= Virgin Material used / Production Value of Manufacturing
- **Secondary Materials Percentage (cradle to cradle)**
= Secondary Materials Used / Total Materials Used
- **Circular Economy Production Percentage**
= Circular Economy Production Value / Total Production Value



Strategy 3: Cluster Networking

Mega-Cluster Network, Global Cleantech Cluster Association

GCCA - Making Local, Global

- 53 Cleantech Clusters, 29 countries, 10'000+ companies
- 9 Digital Deployment HUBs (Europe, Asia, North America, Middle East)
- GCCA Later Stage Award: 700+ Nominees, 180 Top 30 Finalists, 60 Top 10 Winners since 2011
- Focus Finance Innovation: Large scale deployment of proven low carbon technologies, Multi-Asset Renewal Fund/MARF Programs



Taiwan Bluebird D-Hub as a Digital Platform



企業
Corporates

投資者
Investors

群聚會員
Clusters

<http://bd-hub.skipsolabs.com/en/>

Outsource Innovations by using our **Call Catalyst** Tool Efficient and easy way to find solutions for renewal and for your R&D and growth strategies

Bluebird D-Hub offers investors the **top deal flow from Taiwan and GCCA global network**. Easy to Sign up, find the perfect match and connect directly with companies.

Taiwan Bluebird D-HUB is part of the GCCA D-HUB Network digitally connecting global clusters and their member companies with each other and with investors and markets

Bluebird D-Hub Functions



Call Catalyst

Innovation calls of corporates are published on Bluebird D-HUB, and SME's and Start-ups are invited to submit their best-matching solutions. This proven open innovation process results in personal engagement and dialogue between entrepreneurs and decision makers at corporate executive levels

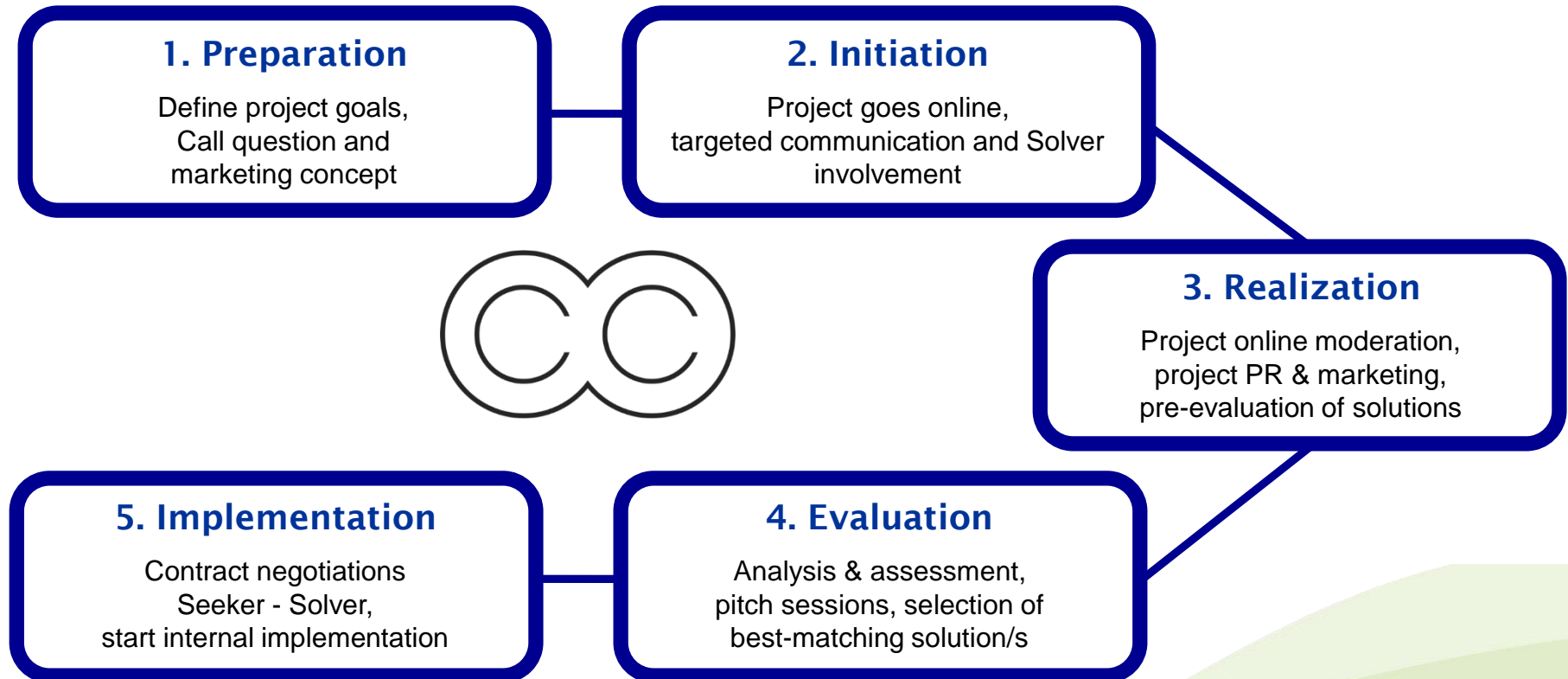
With access to top deal flow from Taiwan and our worldwide network you can find the **perfect match of your interests** and **connect directly with the companies**. Easy to use search tool gives you quick access to companies that fit your domain. Match Maker is available for all investors: Seed-funding, VC, Corporate Venture Capital, Institutional etc. Create a profile and connect with companies and other investors

Match Maker



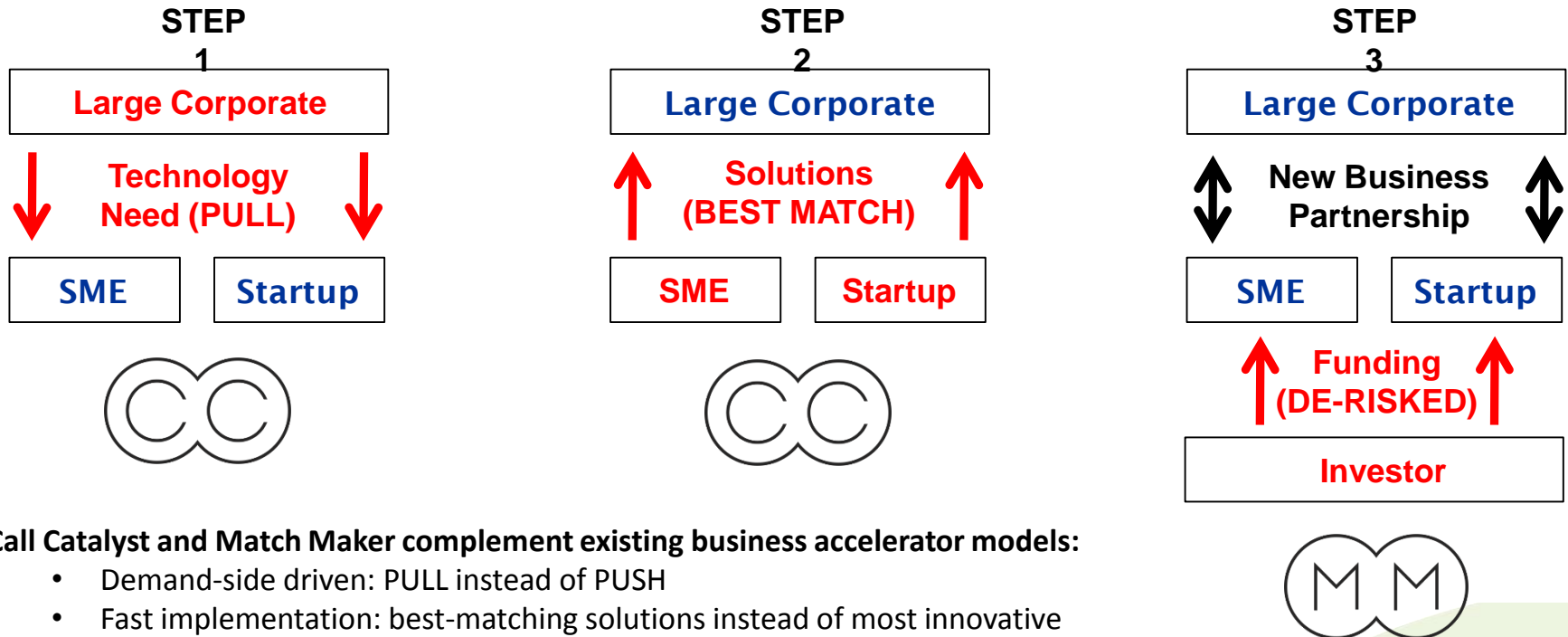
Call Project Process

CALL CATALYST: FIVE PROCESS STEPS



Call Project Steps

USP: **DEMAND-SIDE DRIVEN, BEST MATCH, FINANCIAL LINK**



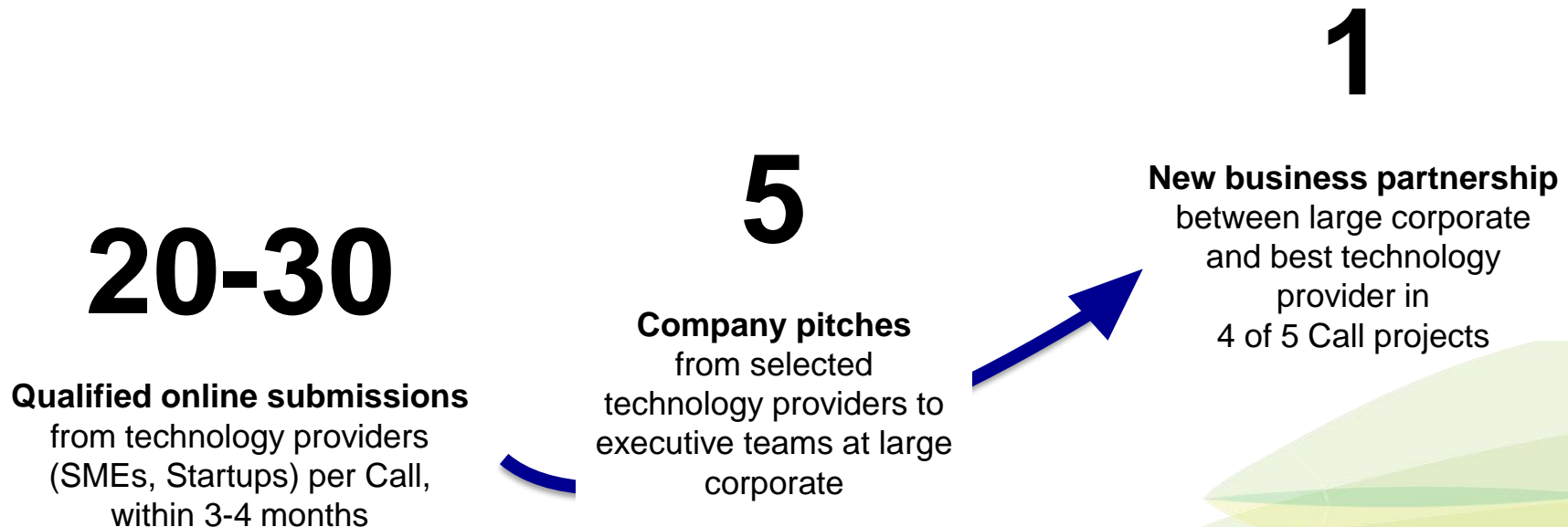
Call Catalyst and Match Maker complement existing business accelerator models:

- Demand-side driven: PULL instead of PUSH
- Fast implementation: best-matching solutions instead of most innovative
- Finance innovation: linked to Multi-Asset Renewal Fund/MARF Programs
- Digital and physical ecosystems: global instead of local network

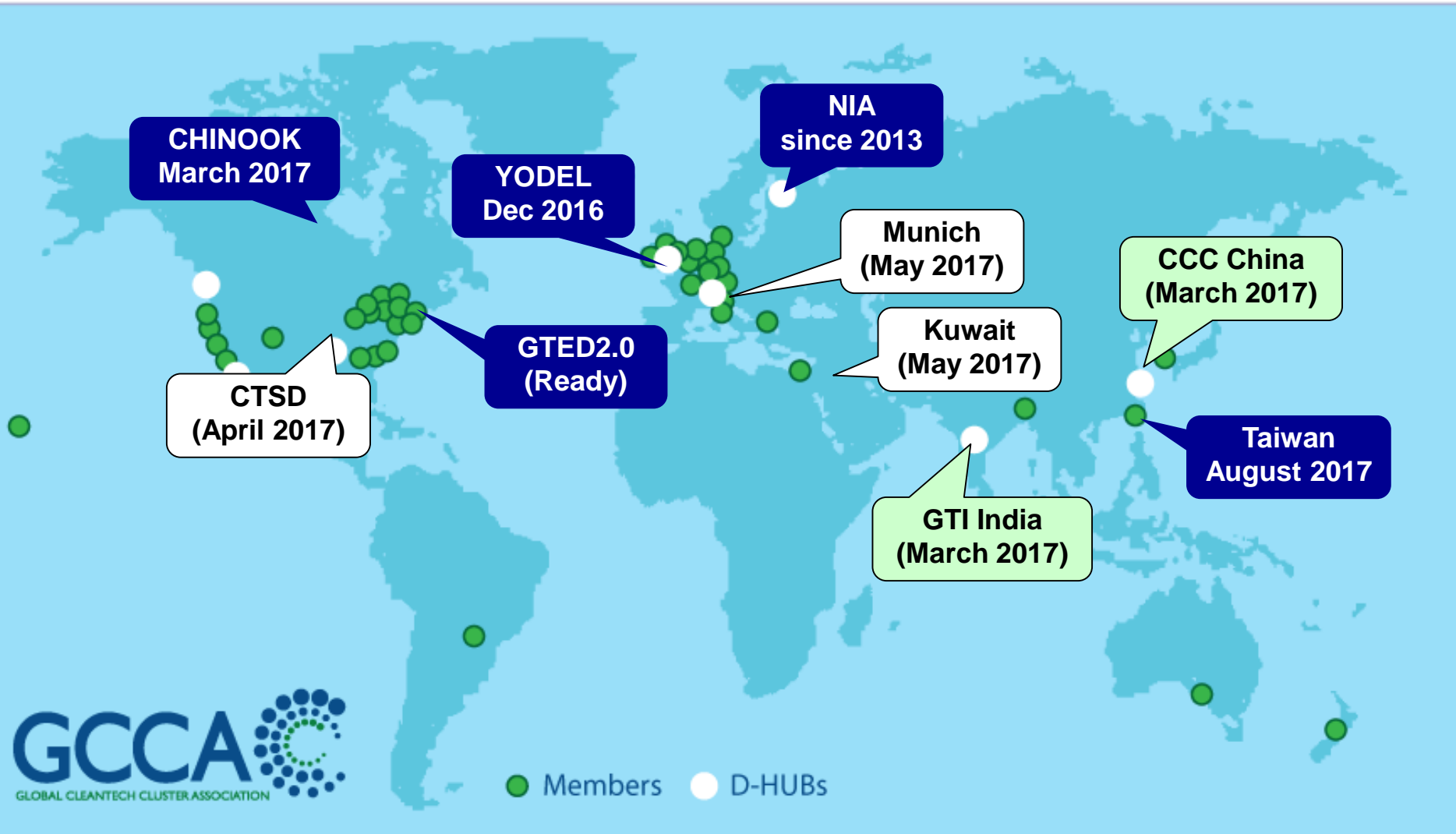
Partner Matching Process

CALL PROJECTS: AVERAGE **80% SUCCESS RATE**

A Call project - on average - leads to the following results (Example NIA, Helsinki: 7 new partnerships in 2 year pilot phase):



Global Rollout: D-HUBs by Aug 2017



Thank You

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