



Agenzia nazionale per le nuove tecnologie,
l'energia e lo sviluppo economico sostenibile

How to stimulate secondary raw material markets

By-products valorization with industrial symbiosis

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Chamber of Commerce of Molise Piazza della Vittoria, 1 – Campobasso

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- ENEA is the Italian National Agency for New Technologies, Energy and Sustainable Economic Development
- It is a public RTO (Research and Technology Organization) operating in the fields of energy, the environment and new technologies to support the Country's competitiveness and sustainable development
- ENEA's mission is to develop new technological solutions to meet the societal challenges, fostering transition to a low-carbon economy
- The institutional mandate of the Agency is to disseminate and transfer knowledge, innovation and technology to industry, institutions and civil society at large





1952

- Establishment of the National Committee for Nuclear Research (**CNRN**) within CNR
- Mission and scope: Development of **civil applications of nuclear energy** with a **multidisciplinary** approach

1960

- Conversion into the National Committee for Nuclear Energy (**CNEN**)
- Mission: **Centre of excellence for technology development** to support the rising national industry

1982

- Establishment of **ENEA**, Italian National Agency for Atomic Energy and Alternative Energies
- **Energy** issues became a **major research focus** alongside the traditional nuclear research

1991

- Broader mission and further research areas to explore
- **Renewable energy**, **environmental protection**, **innovation** become key research fields

2003

2009

- ENEA becomes **Agency, under the Ministry of Economic Development** with a revised mission of R&TD in the fields of energy and new technologies, and has a leading role in promoting **innovation for sustainable and competitive development**

2016

- Further role as Italian National **Agency for Energy Efficiency**
- Participation in *ad hoc* Working Groups and research activities carried out in collaboration with national, European and international organisations
- The Italian Ministry for Economic Development has appointed ENEA's President and Board of Directors (July 2015)



ENEA's activities span many fronts ranging from basic to **applied research** and **innovation**:

- **Research**: Basic, mission-oriented, applied and industrial research, also through the development of prototypes and product industrialization
- **Technology Transfer**: Dissemination and transfer of research results to industry and public administrations, and exploitation for production purposes
- **Advanced services**: Studies, measurements, tests and assessments tailored to both public and private bodies and enterprises
- **Training and information**: Activities aimed at broadening sector expertise and public knowledge and awareness



Research facilities

- **9** Research Centres
- **5** Research Laboratories
- **13** Territorial offices
- **Brussels** Liaison Office
- **Headquarters** in Rome

Human Resources (as of 30.06.2016)

2514 permanent staff:

- **36%** women
- **59%** graduates



Fusion & Nuclear Safety

- Fusion
- Fission (new gen)
- Nuclear systems and components qualification
- Radiation protection
- Ionizing/non ionizing radiation applications
- Radioactive waste management



Energy Technologies

- RES (PV, CSP)
- Energy efficiency technologies
- Bio-fuels
- Smart grids
- Smart Cities
- Storage
- Sustainable Mobility
- Advanced energy materials
- Sustainable use of fossil fuels
- Distributed Intelligence and Robotics



Sustainable development

- Resource efficiency
- Environmental technologies
- Climate change: modeling, adaptation and mitigation
- Prevention and Recovery
- Seismic and natural hazards assessment and prevention
- Biomedical Technologies
- Bio- and nanotechs
- Agrifood
- Risk Assessment



ENEA – Department for sustainability

- Characterization, prevention, and recovery - Technologies and modelling in a large range of fields:
- Circular economy and resource efficiency
- Waste management (urban and industrial)
- Water cycle and water resource management technologies
- Innovative materials (composites, ceramics, nanostructured)
- Scenarios and Forecasting models and evaluation of air pollution impact
- Oceanographic and climatic modelling with GIS and satellite (climate change, experimental study of the marine environment, regional models, etc.)
- Industrial biotechnology, radiation biology, biomedicine
- Innovation of agribusiness (food chains and districts)
- Advanced Diagnostics (earth observation, environmental sanitation, food)

Division: Resource Efficiency



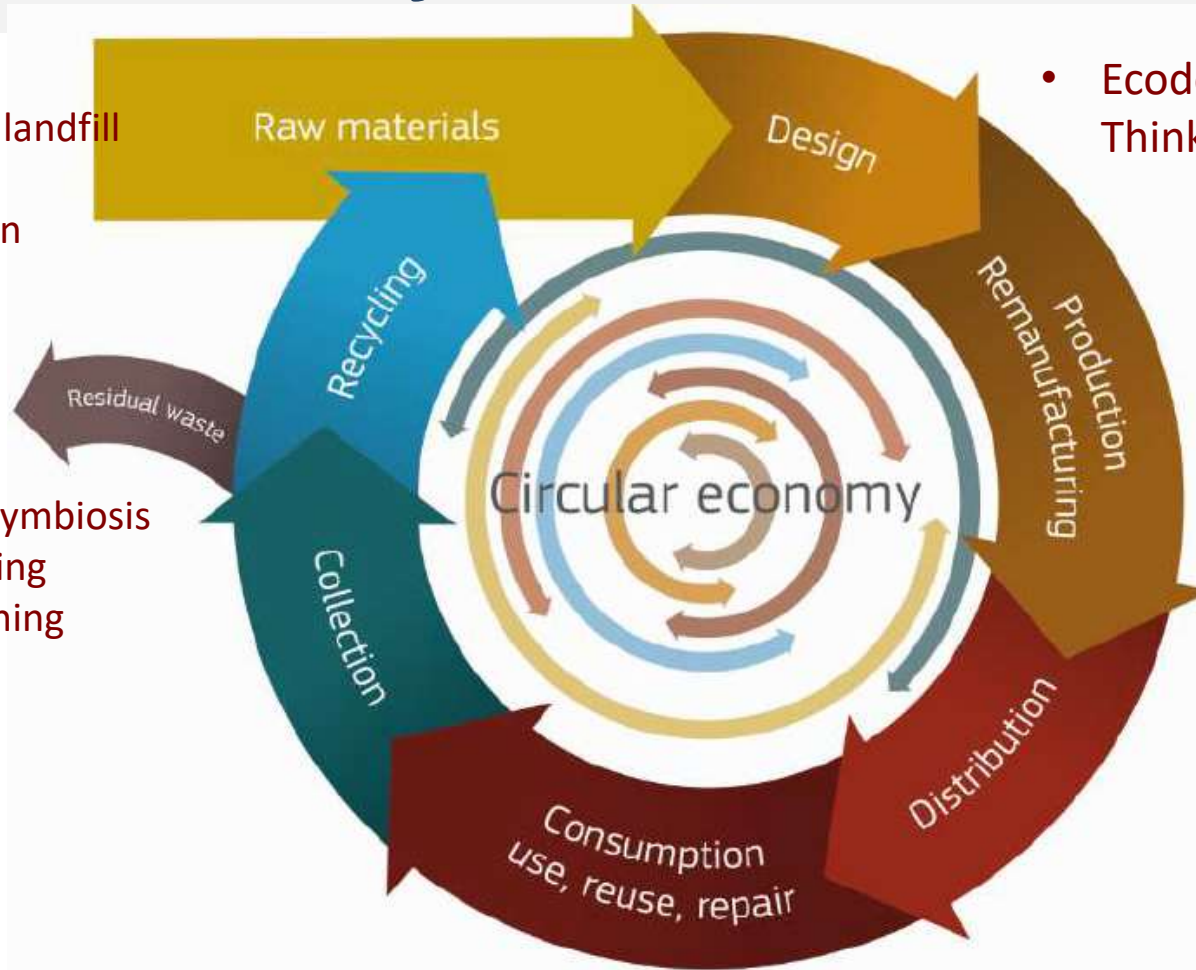
The Division supports the Country in the transition towards new production and consumption system based on sustainable supply and use of resources and on reduction of industrial emissions and social impacts. Closing the loops approach is pursued as a necessary goal to move towards a circular economy at various levels: within production processes, in industrial areas, on urban and extra-urban areas.



Circular economy

- Mining
- Urban and landfill mining
- Substitution
- Ecodesign
-

- Industrial symbiosis
- Urban mining
- Landfill mining

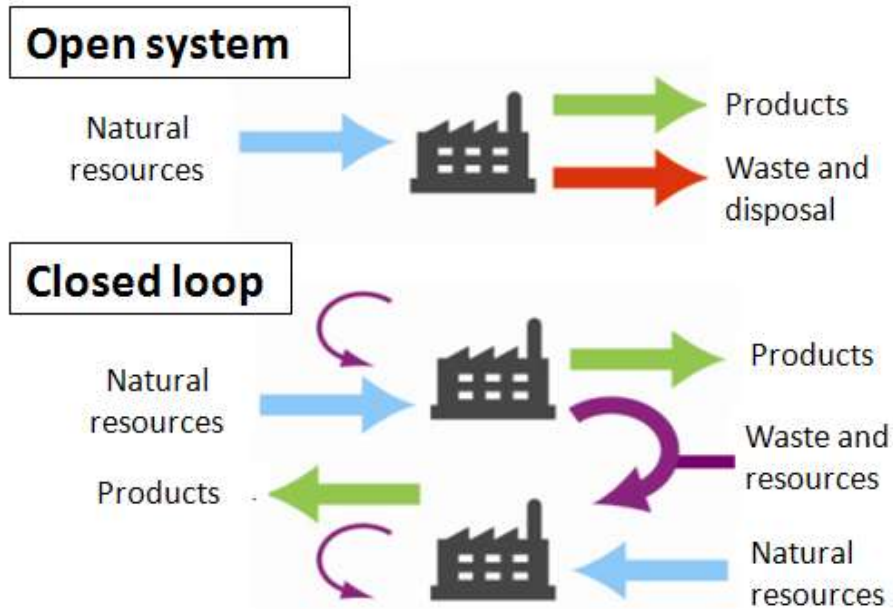


- Ecodesign, Life Cycle Thinking (LCT, LCA,..)

- Green technologies
- Industrial symbiosis
- new business models

- Market , standards, tenders (*GPP, green supply chain*)
- fiscal and economic instruments
- Sharing economy and new business models
- Consumers

Industrial symbiosis



Waste from one industry can become resource for other industries ("synergy")

Economic advantages:

- costs reduction for raw materials and energy supply and for landfilling;
- creation of business network and new market opportunity.

Environmental advantages:

- optimizing the use of resources
- mitigation of pressure on environment, saving emissions and landfilling.

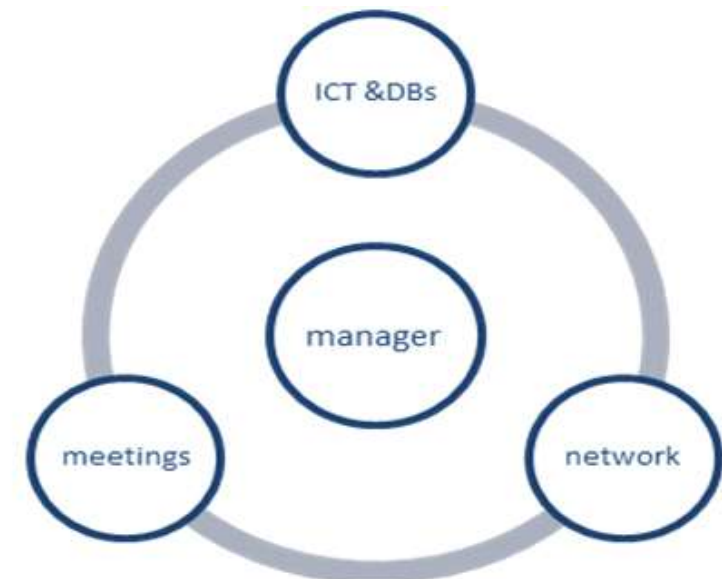
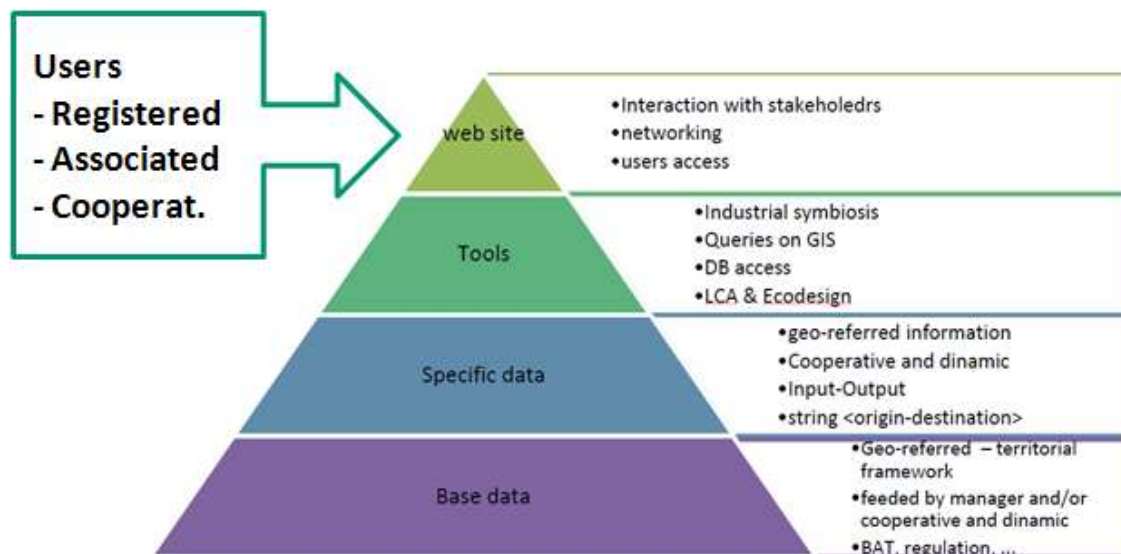
Social advantages:

- occupation (green jobs);
- cultural change (sharing economy).

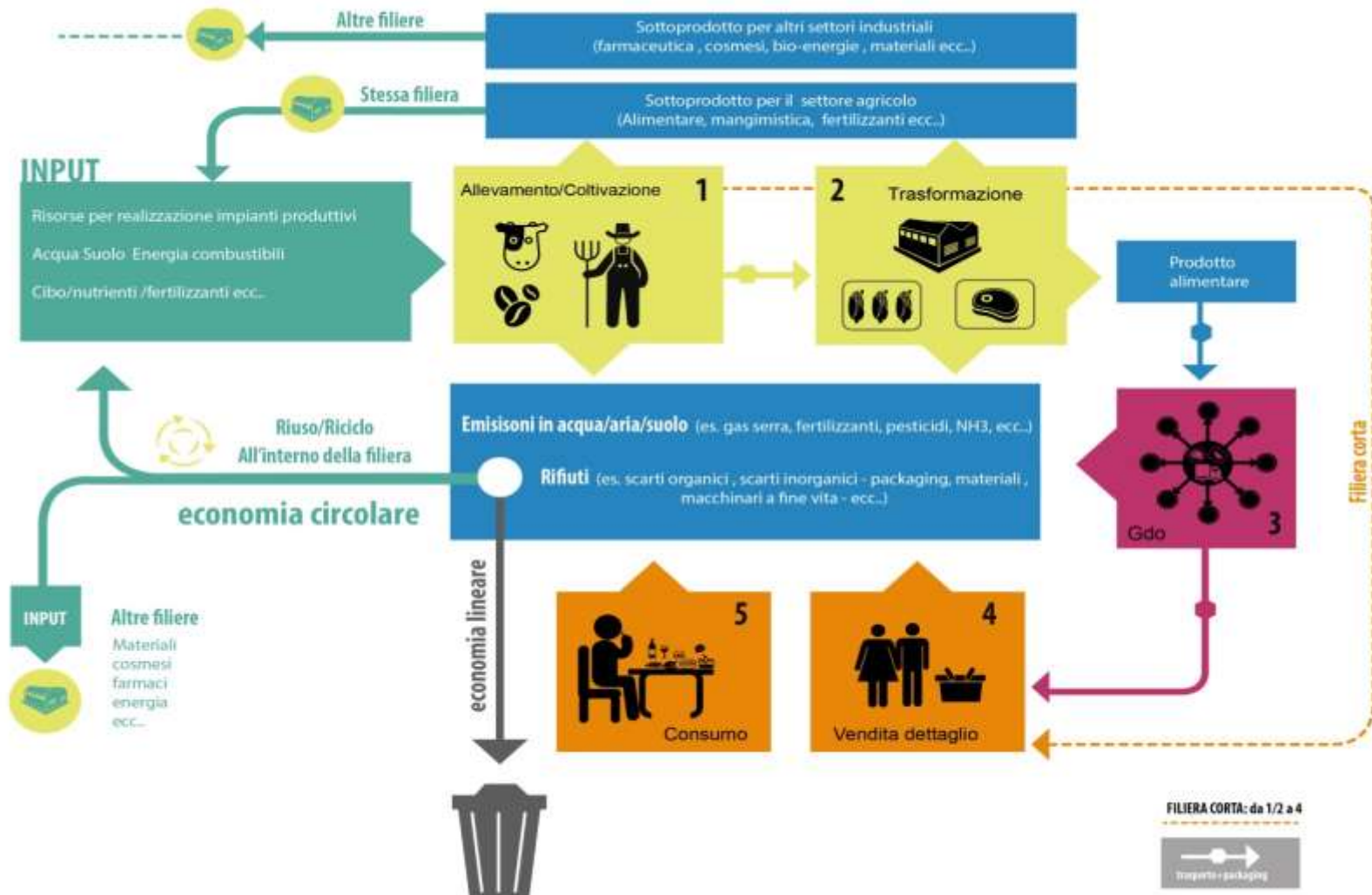
*“Industrial symbiosis engages **traditionally separate** industries and other organisations in a **network** to foster **innovative strategies** for more sustainable resource use (**including materials, energy, water, assets, expertise, logistics etc**)” (Lombardi & Laybourn, 2012)*

ENEA Industrial Symbiosis platform

- **Network** (including companies, innovators, entrepreneurs, regulators, academics, regional government);
- **Data** (geo-referred): general DBs, local framework; specific DBs, available resources;
- **Skills**: including technical and scientific, which allow the identification of possible synergies (identify connections, facilitate communication across sectors, deal with technical, financial or regulatory barriers);
- Participation of **users**: the interface with potential users through a web portal and dissemination and promotion activities.



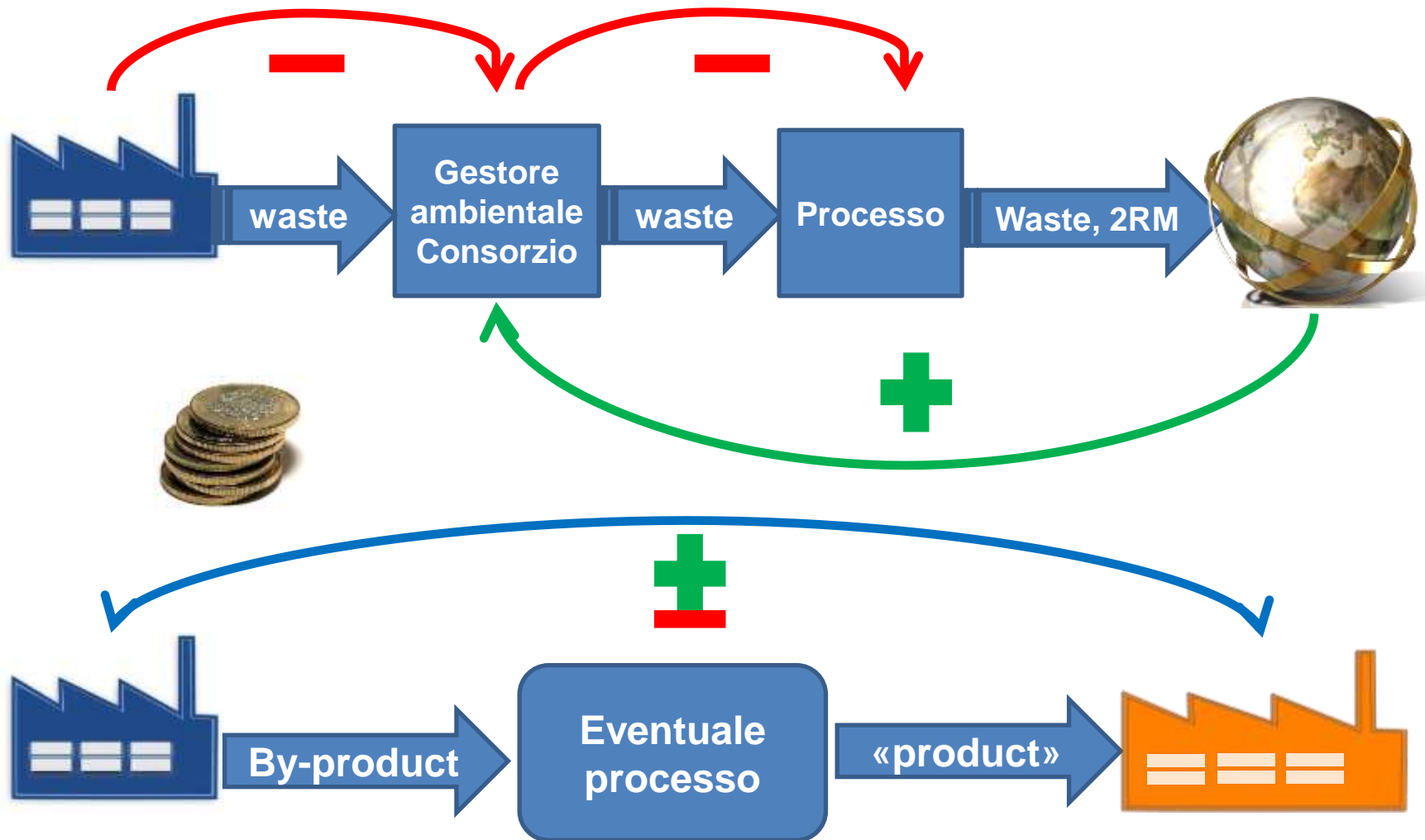
Activities on resource efficiency



Constructions and quarries value chain



SI vs BaU



IS in ENEA from 2010

2011 – 2015
Ecoinnovazione Sicilia

2013
AQ – NISP
EUR-ISA

Atti convegni SI 2012-14

2012 /13
Piattaforma SI

2014
Convegno Ecomondo SI

2015
G7 – AoRE –Berlin,
B'Ham

2012
1^convegno
Ecomondo SI

2014-2016
ASI Rieti

2016
STORM, FOOD-
CROSSING-
DISTRICT, ERMAT,
SIMBIOSI UMBRIA

2013
Convegno Ecomondo
SI

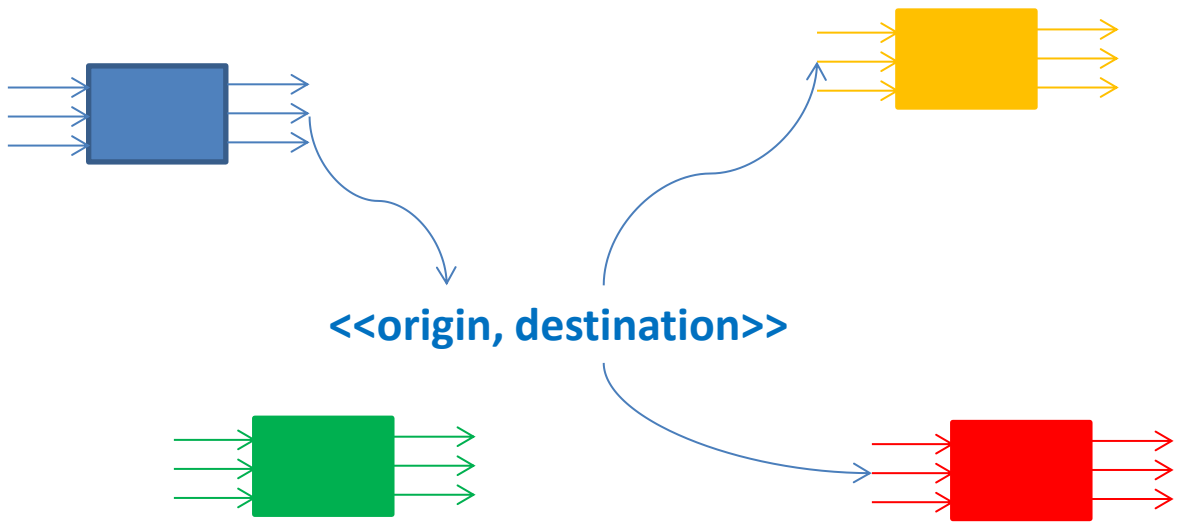
GREEN SIMBIOSI
INDUSTRIALE IN
EMILIA ROMAGNA

2017
SUN
FORMALIZZAZIONE
ED AVVIO ATTIVITA'



The IS platform methodology

Scheda raccolta dati di INPUT-OUTPUT							
INPUT ENTRATA	Processo 1 Processo 1	Processo 2 Processo 2	Processo 3 Processo 3	Processo 4 Processo 4	Processo 5 Processo 5	Processo 6 Processo 6	Processo 7 Processo 7



ENEA's activities on IS

Sicilia – (Camera di commercio, Univ. of Catania, Confindustria). 90 imprese partecipanti georeferenziate - circa 400 I/O - 600 sinergie potenziali

Lazio – Area industriale di Rieti (ASI Rieti Cittàducale). 27 imprese partecipanti georeferenziate - circa 140 I/O - 110 sinergie potenziali

Emilia-Romagna – ASTER e camera commercio Bologna. 10 imprese partecipanti georeferenziate - circa 100 I/O - 90 sinergie potenziali

Emilia-Romagna – Progetto FOODCROSSING. Progetto in corso finanziato dalla Regione ER nel settore agroalimentare

Umbria – Sviluppumbria - Progetto in corso finanziato dalla Regione Umbria, svolto in collaborazione con Sviluppumbria

STORM “Industrial Symbiosis for the Sustainable Management of Raw Materials”
ERMAT “Efficient use of Residual Materials”.

IS – a synergy in Sicilia Region



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DITTA
F.lli Messina s.n.c.
di Messina Nello Orazio e Rosario
Lavorazione marmi, graniti e pietre



Progetto Ecoinnovazione Sicilia

Supporto allo sviluppo delle attività produttive nel Sud: interventi pilota per la
sostenibilità e la competitività di turismo ed aree industriali

Piattaforma Regionale di Simbiosi Industriale

Follow up Tavoli di Lavoro

di Siracusa del 28/03/2014 e di Catania del 24/10/2014

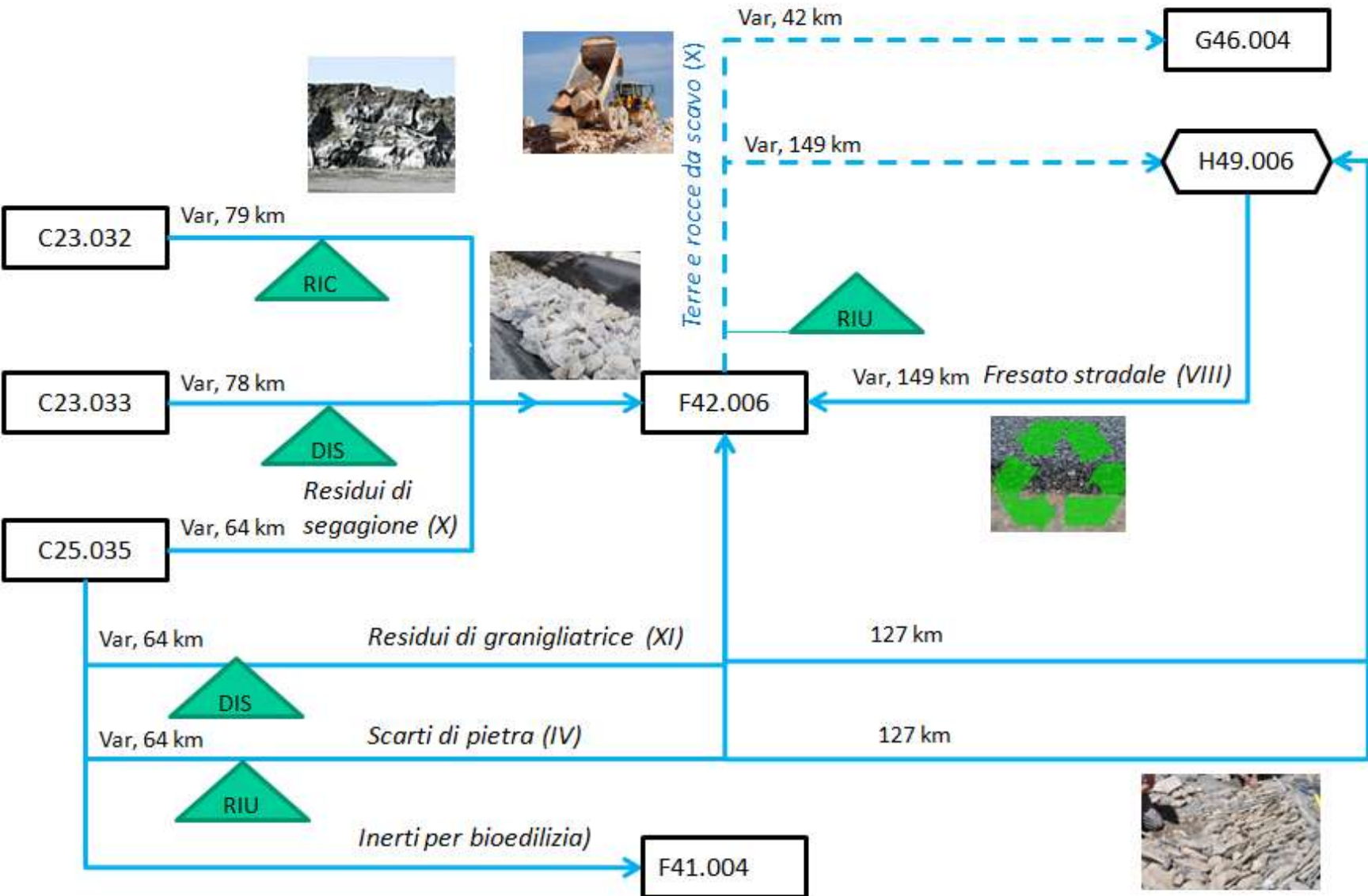
Manuale Operativo
per il riutilizzo dei limi di segazione in
sostituzione degli aggregati naturali

90 imprese

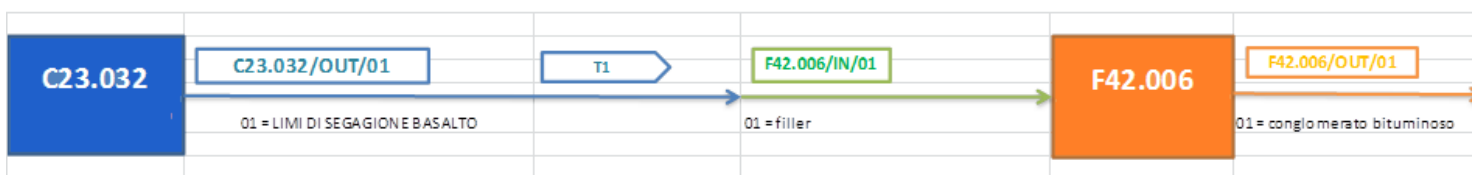
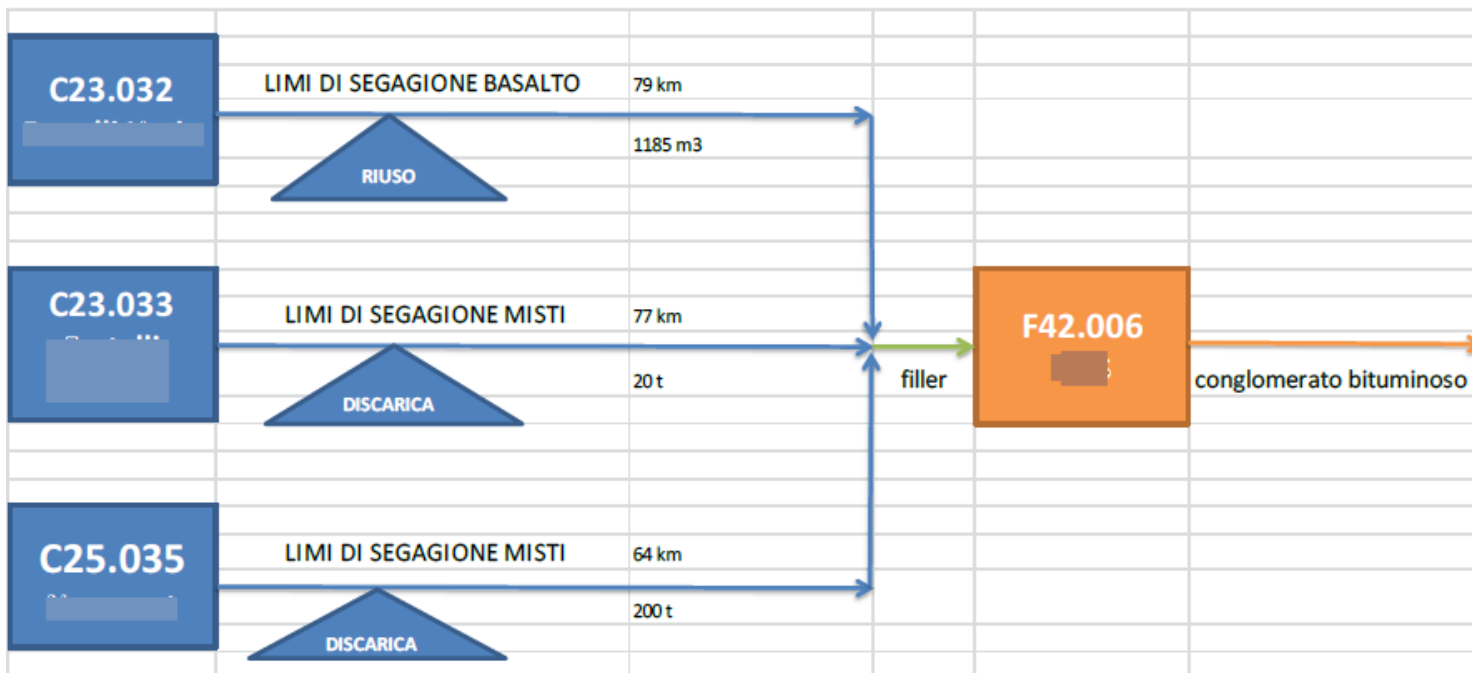
**DISTRETTO
PRODUTTIVO
PIETRA LAVICA DELL'ETNA**



IS – a synergy in Sicilia Region - Layout

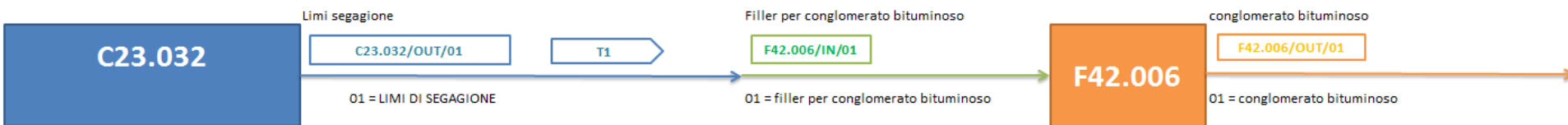


IS – a synergy in Sicilia Region – simplified layout and part of the summary scheme



IS – a synergy in Sicilia region – Simplified layout and Summary scheme

Quadro sinottico



sottoprodotto	sottoprodotto	prodotto	prodotto
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CARATTERISTICHE DEGLI SCARTI E POSSIBILI RIUTILIZZI

Tipologie di scarti provenienti dalla lavorazione dei materiali lapidei		-	
Possibili riutilizzi degli scarti: - Riutilizzo degli scarti di varia pezzatura - Possibili riutilizzi dei limi di segazione			
NORMATIVA			
Regolamentazione degli scarti provenienti dalla lavorazione dei materiali lapidei		Normativa e norme tecniche per il riutilizzo nel campo delle costruzioni	
<i>D.M. 161/2012 - Art 1 lett. b (I residui di lavorazione dei materiali lapidei sono considerati materiali di scavo)</i>		<i>Direttiva 89/106/CEE relativa ai prodotti da costruzione (abrogata) DIRETTIVA DEL CONSIGLIO del 21 dicembre 1988 relativa al ravvicinamento delle disposizioni legislative, regolamentari e amministrative degli Stati membri concernenti i PRODOTTI DA</i>	

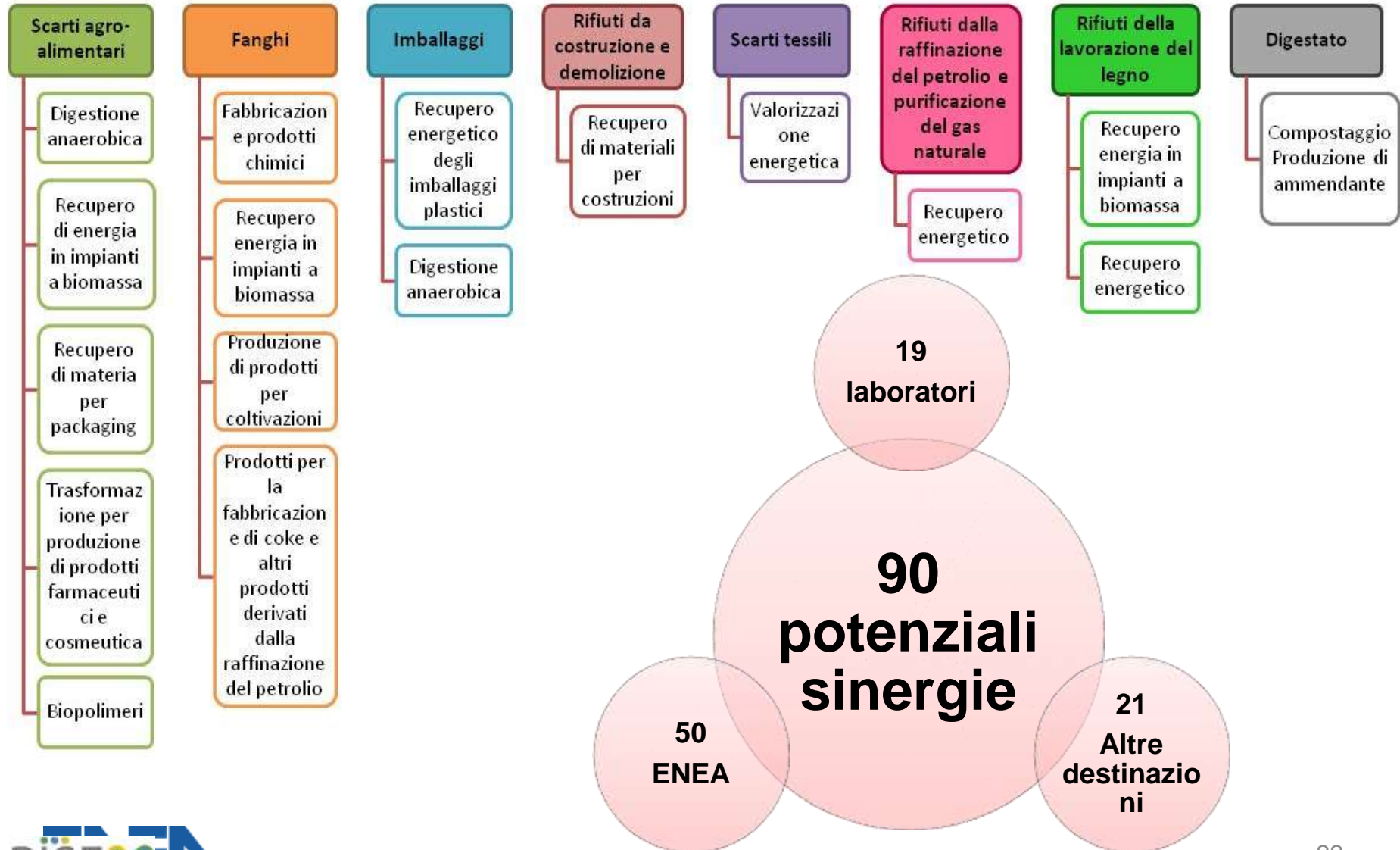
Legenda generale

- C X, 01 Azienda che mette a disposizione le risorse
- F X, 01 Azienda che può accettare le risorse
- Flusso di materia
- CX, 01/OUT/01 Risorsa in output dell'azienda C X
- FX, 01/IN/01 Risorsa in input dell'azienda F X (Conforme)
- FX/OUT/01 Risorsa in input dell'azienda F X
- T Trasporto

Legenda della tabella

- Aspetto non ostacolante (🟢)
- Aspetto da approfondire (🟡)
- Aspetto ostacolante (🔴)

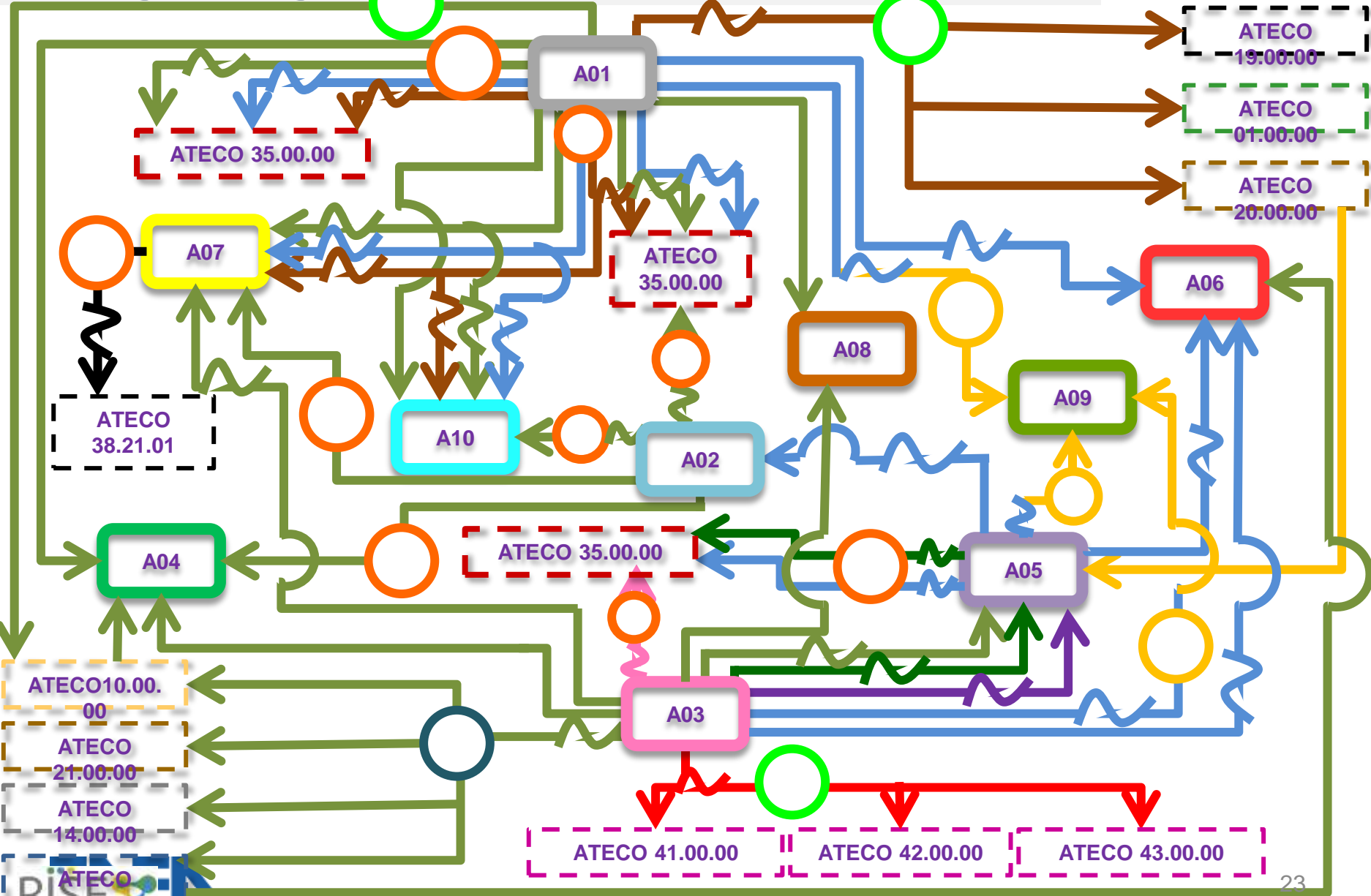
The Green Industrial Symbiosis project in Emilia Romagna Region



The Green Industrial Symbiosis project in Emilia Romagna Region



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Elaborazione risultati:



Industrial Symbiosis **platform**:
www.industrialsymbiosis.it



Symbiosis Users **Network**: Italian
network of Industrial Symbiosis,
promoted by ENEA. www.sunetwork.it



Eur-ISA, launched on November 6th 2013, aims
to connect the industrial symbiosis **networks**
across European member states.

ENEA is a founding member (with Belgium,
Denmark, England, Finland, Hungary, Ireland,
Netherlands, Northern Ireland and Turkey).
www.eur-isa.org



La Rete



SUN riunisce 19 partner provenienti da Università, Istituzioni politiche, Enti di ricerca, Società private, reti tecnologiche ed Enti locali. Tramite la collaborazione sul tema della simbiosi industriale tra i diversi operatori, pubblici e privati, SUN rappresenta l'occasione per condividere esperienze, problematiche, e di studio delle opportunità a livello economico, territoriale e sociale sui temi della simbiosi industriale.



Fai parte del Network

SUN è aperta all'adesione di altri interessati (imprese, istituzioni, associazioni, mondo della formazione e della ricerca) che vogliono contribuire ad arricchire il patrimonio di competenze e a farsi promotori di iniziative comuni per facilitare l'applicazione della simbiosi industriale in Italia.



European Economic and Social Committee



- The European Circular Economy Stakeholder Platform brings together stakeholders active in the broad field of the circular economy in Europe.
- As a "**network of networks**" it goes beyond sectorial activities and highlights cross-sector opportunities and challenges, providing a meeting place for stakeholders to share their solutions and team up to address specific challenges, while bridging existing initiatives, and advocating the circular economy at national, regional and local level, and supporting its implementation.

An EU-wide interactive project steered in partnership with European civil society



Laura Cutaia

