National Technical University of Athens

Adriatic Symbiosis Networks

Innovative resource management
with the use of symbiosis

- Industrial symbiosis clusters
- Bio-energy and bio-waste networks
- Promoting the blue and water biorefinery concept

2014-2020 Interreg ADRION

9th - 10th December 2015

Bologna

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School of Chemical Engineering

EU Strategy for the Adriatic and Ionian Region
EUSAIR

NTUA

- The oldest technical institution (1837) and the first choice of students in science and engineering
- 9 academic schools: 8 on engineering and 1 on applied science
- 8.500 undergraduates and 1.500 postgraduates
- 600 academic staff, 140 scientific assistants and 260 administrative and technical staff
- Attracting 50% of the research funds in the country

dustrial symbiosis clusters

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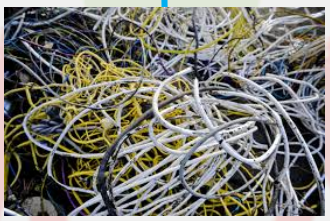
Motivation

Untapped waste, setting up a unique opportunity for cross-national links, essentially setting up a new paradigm (a **sea concept**) to promote symbiosis

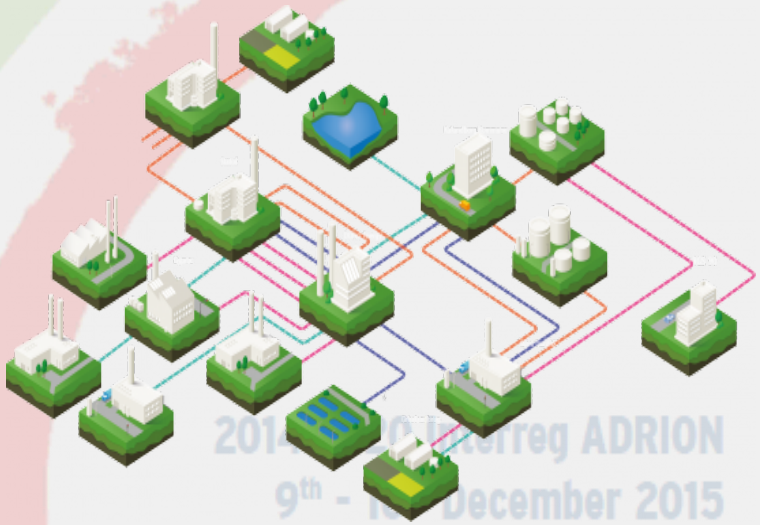
Wood
Plastics
Metal
Heat
Textiles
…







KALUNDBORG SYMBIOSIS



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Triple Helix credits

NISP
NATIONAL INDUSTRIAL SYMBIOSIS PROGRAMME

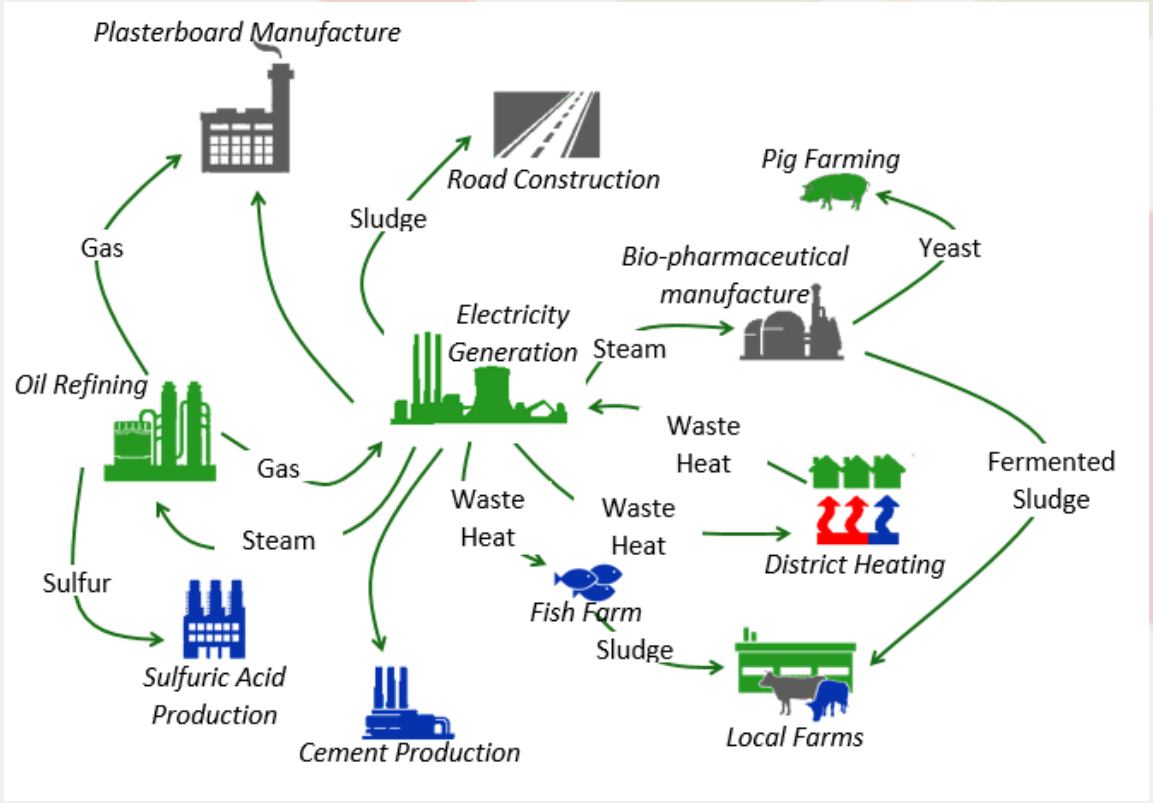
NISP's Results include:

- ü £1 billion cost savings achieved
- ü £1.4 billion generated in additional sales
- ü Over 10,000 jobs created or safeguarded
- ü 45 million tonnes materials recovered and reused
- ü 39 million tonnes industrial carbon emissions reduced
- ü 71 million tonnes industrial water savings made

EUSAIR

Aims and Project offer

- ü Assess the potential for IS in the Adriatic
- ü Identify key sectors to benefit more
- ü Identify plans to promote potential to business
- ü Assess enablers to foster links
- ü Develop ICT technology to register, present and visualize potential



Strengths and expertise

- Past record, experience and tools from EU and national projects
  - **e-Symbiosis** – Platform to support and build symbiotic links
  - EPIC 2020 – Assessing the bioenergy potential of EU ports
  - AI4b – Sustainable supply chains using residues

Stakeholders & roles

Ø Eligible partners
- v Regional and local authorities
- v Industrial and professional associations
- v Academic experts
- v Dissemination centers

•Ideal Coordinator
- Regional authority with a vision (the ‘Adriatic Kalundborg’)
- Research/dissemination center

Bioenergy and biowaste networks

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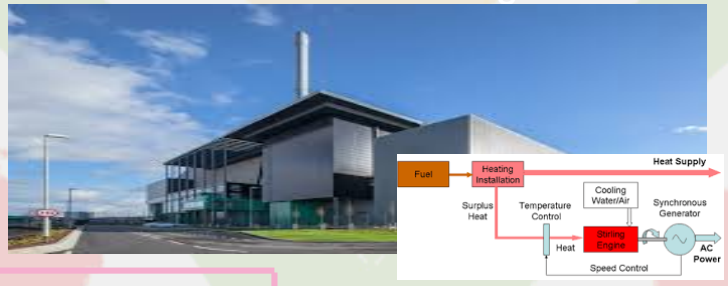
Motivation

Bring emphasis on bio-renewables (e.g. agricultural waste, organic municipal waste)

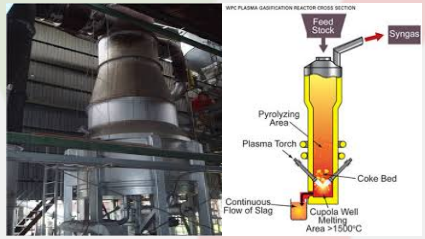
Anaerobic digestion

Combined Heat /Power generation



Agricultural wastes

Gasification

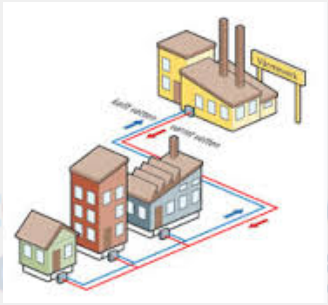


Fish and animal farm residues

Municipal solid and liquid wastes

ELECTRICITY

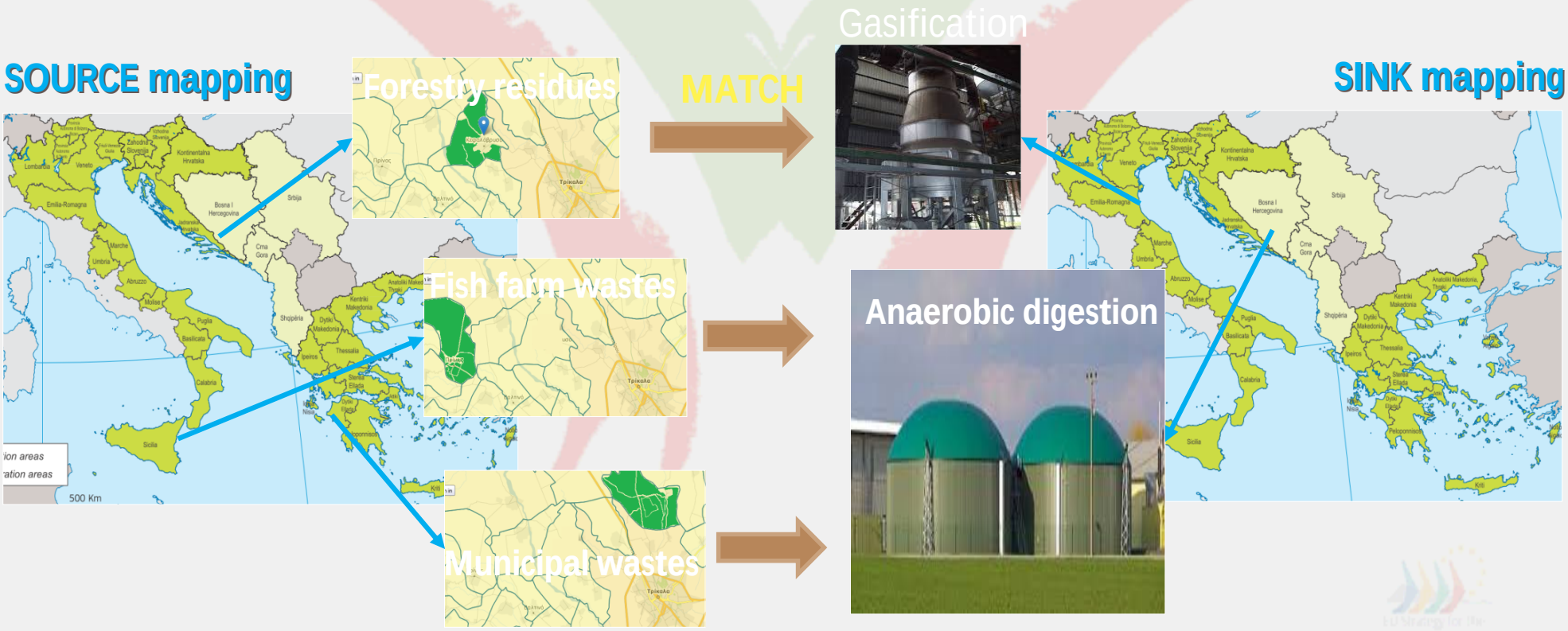
HEAT



FERTILIZERS

Aims and Project offer

ü Assess bio-energy potential
ü Assess investment (enablers) to locate and promote integrated use
ü Develop dedicated ICT tools with services, GPS systems to register and communicate supply and demand



Strengths and expertise

- Ø Bring together fragmented work in different nations
- Ø Capitalize on ICT platforms and data available
  - Ø AI4b – Sustainable supply chains using residues
  - Ø Similar work available in Italy
- Ø Capitalize on previous EU and national projects
  - Ø EPIC 2020 – Assessing the bioenergy potential of EU ports
  - Ø RENESENG – Marie Curie project on biorenewables
  - Ø BIOCORE/D-Factory/RESYNTEX – IP projects in industrial biorefineries

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• •4• (www.ai4b.gr), is an innovative IT infrastructure for the exploitation of biomass, leading to economically and environmentally sustainable bioenergy practicess.

Ai4b

EUSAIR

Stakeholders & roles

- Ø Partners
  - v Regions active in agricultural residues
  - v Urban areas with untapped organic waste
  - v Energy users (industries, urban sites such as hotels, hospitals, schools etc)
  - v Dissemination centers
- v Ideal Coordinator
  - v Development agency in a rural area
  - v Research/dissemination center

Port-to-Port Symbiosis

Strengthening the sustainability of Adriatic coastal regions using port-to-port bio-energy symbiosis

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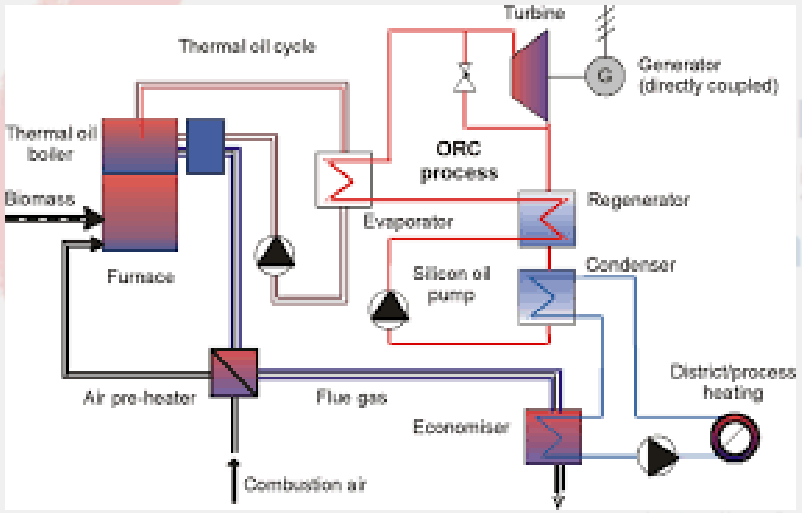
Aims and Project offer

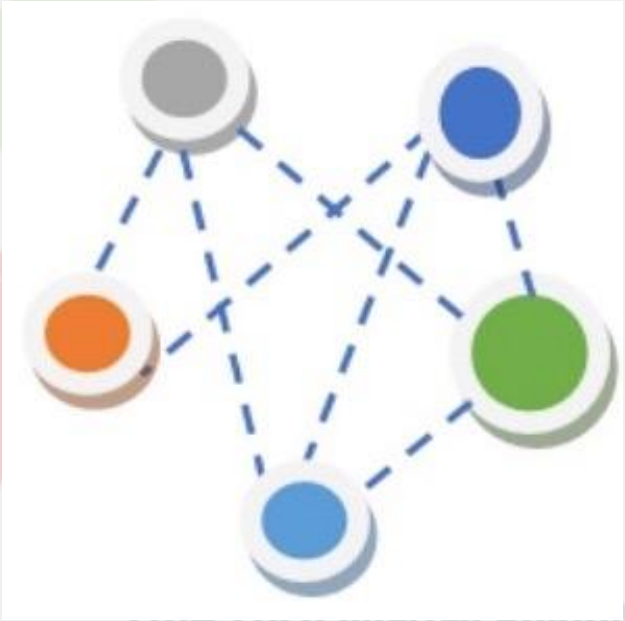
- Ports – ideal site to integrate industrial and urban flows
- Integrate waste fuels in commuting vessels
- Unique paradigm of Symbiosis and the opportunity for trademark IS practices with the identify of the Adriatic region

Support the transformation of the Adriatic area into efficient and carbon neutral, urban integrated energy eco system by applying the industrial symbiosis approach



Aims and Project offer

Evaluate Industrial Symbiosis in combination with existing sea routes
Evaluate and assess new paths to promote IS
Integrate paths with regional bio-energy potential



SymbioICT
ICT Infrastractures for supporting Symbiotic Networks

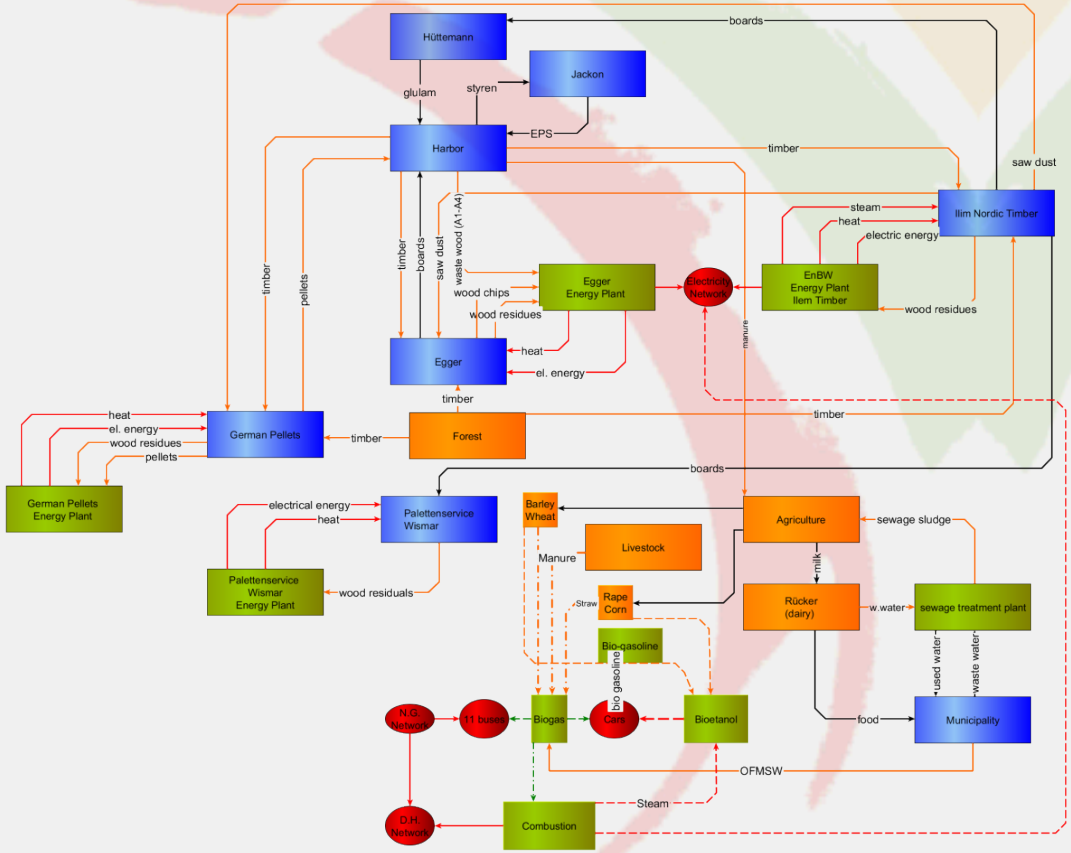
ü Recording and intelligent matching of needs and haves

ü Background computational mechanisms for building critical masses of loads and making decisions for flexible dispatching

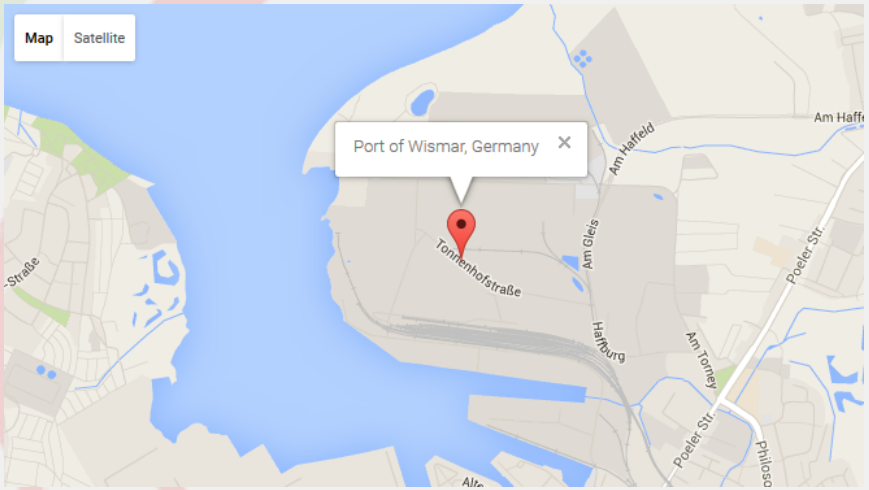
Strengths and expertise

Ø Networking technology for symbiosis as it has been applied in the course of several EU and Greek projects

Ø EPIC 2020 – Assessing the bioenergy potential of EU ports



Example Symbiosis at the port of Wismar



Ø AI4b – Sustainable supply chains using residues

Ø e-Symbiosis – Platform to support and build symbiotic links

Stakeholders & roles

- Partners
  - Industrial ports
  - Professional and industrial associations
  - Academic institutions and dissemination centers
- Industrial port, preferably one with a commitment to promote such concepts or to attract investment

Adriatic Marine Biorefinery Networks

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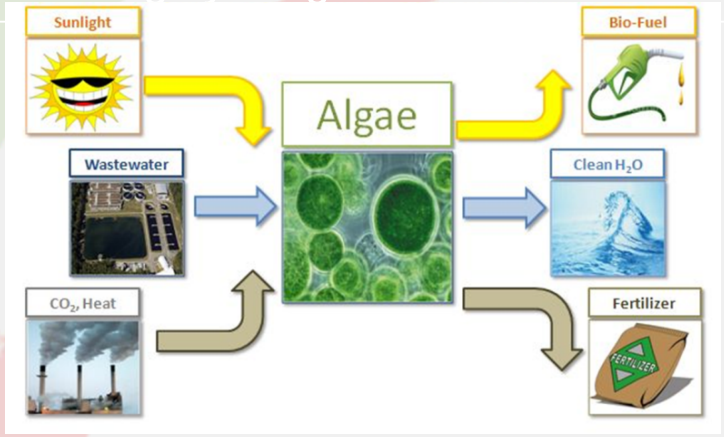
Aims and Project offer

Ø Assess the potential of Adriatic to host blue industries and water biorefineries
Ø Strengthen small-scale industrial output in the region using IS to scale up and integrate production lines
Ø Build synergies between water industries (e.g. fish farms, salt pans, algal production, specialty chemicals using water substrate etc)
Ø Develop sustainable and viable business models using synergies

SALTPANS

ALGEA biorefineries

Advance **biofuels**
and
fine chemicals/pharmaceuticals!



Marine fish farms

Fish processing residues

Biorefinery

biogas

Stakeholders & roles

- Potential partners
  - Associations of industries representing
    - Salt lakes,
    - fish farms,
    - food and diary industries
    - CO_2 producers
  - Regional authorities
  - Academic institutions
  - Coordinator with a will to drive business into Adriatic

Contact details

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