Dealing with the Supply Chain

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GBEP
Global Bioenergy Partnership

WORKING TOGETHER FOR SUSTAINABLE DEVELOPMENT

Biorefinery Supply Chain: A New Hope for Agriculture

✓ The development of biomass agnostic Biorefineries has opened new horizons for agriculture in areas which are not the most fertile of the world.

✓ Chemtex and Beta Renewables have invested worldwide in developing new supply chains and work with States and NGOs to progress a new agriculture.

Supply Chain for a Biorefinery

- ✓ Support of the clients on supply chain issues;
- ✓ Selection of best feedstock for specific projects;
- ✓ Definition of agricultural practices;
- ✓ Set up and support for field trials;
- ✓ Support to start up and manage supply chains;
- ✓ Relationships with and evaluation of suppliers.

Key Factors for Biorefineries' Supply Chain

An advanced technology like Second Generation Biorefineries imposes important requirements to the supply chain, which must deliver feedstock:

- ✓ In large volumes;
- ✓ With stable quality;
- ✓ On a continuous flow;
- ✓ With a high degree of reliability.

The control of the supply chain is a key success factor *(1)*

✓ Relying on the market or a complete outsource to third parties result in a high risk profile and cost position for the whole project.

✓ Biomass-based projects must ensure a certain level of control on their supply chain.

The control of the supply chain is a key success factor *(2)*

Land

Securitization through:
- ✓ Ownership;
- ✓ Long term concession;
- ✓ Long term lease.

Agricultural operations

- ✓ Agronomic plan and tight control of operations;
- ✓ Third parties for execution, only if reliable providers are available, otherwise direct execution.

Logistics

- ✓ Planning and control;
- ✓ Direct management of hubs;
- ✓ Third parties for transports (usually available in all countries).

Requirements for Agronomic Research

Requirements	Drivers of Analysis
✓ Specific needs for Biorefineries.	✓ Cellulose content; ✓ Decay rate of harvested matter.
✓ Additional requirements for economic sustainability.	✓ Yield (MT/ha); ✓ Cost of operations; ✓ Energy density.
✓ Additional strategic requirements.	✓ No competition with food productions.

BETA RENEWABLES S.p.A.

proesa™ technology

New Horizons outside Brazil

Although the wonderful climate and the land availability make of Brazil the Eldorado for biotech, Second Generation Biorefineries make their inroads everywhere and make non-food biomasses attractive worldwide.

Biomasses Scouted

Academic research, backed by self conducted tests, led to selection of biomasses

	Arundo Donax	Miscanthus	Switch grass	Fiber Sorghum
Climate conditions	Temperate climates	Cool climates	Temperate climates	Temperate climates
Type of propagation	Agamic by rhizomes, mp, or stems	Gamic by seeds or agamic by rhizomes	Gamic by seeds	Gamic by seeds
Minimum soil requirements	Damp soils, either fresh or moderately saline	Soils ranging from sands to those high in organic matter	Moderately deep, dry to poorly drained, sandy to clay loam soils are best	Deep, fertile, well-drained loamy soils
Sensitivity to drought	Low sensitivity	Low sensitivity	Medium sensitivity	High sensitivity
Sensitivity to salinity	Low sensitivity	Medium sensitivity	Medium sensitivity	High sensitivity
Yield (in NW Italy's climate) DT/ha	35	20	18	25

Arundo: An Environment Friendly Crop

Resistant to draught, no need for heavy irrigation

Grows on any soil, gives acceptable yield on marginal land

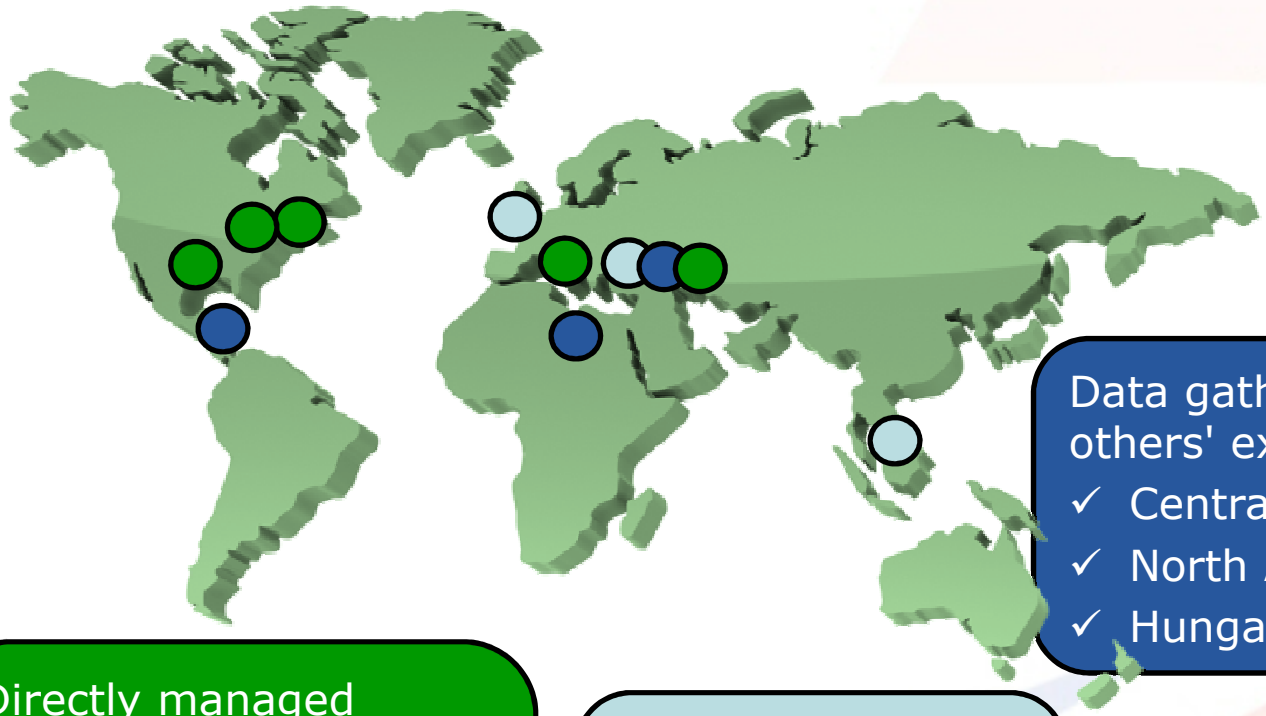
Little fear for weeds and parasites, no need for herbicides and insecticides

Can serve as remediation for polluted spray fields

As a result of the efficiency of the biomass AND the technology, impact on environment is outstanding:

80% GHG reduction!

Beta Renewables Experience Worldwide



Data gathering from others' experiences:
- ✓ Central America
- ✓ North Africa
- ✓ Hungary

Directly managed plantations / test fields:
- ✓ Italy
- ✓ USA
- ✓ Mexico
- ✓ Ukraine

Test fields for potential clients:
- ✓ Bulgaria
- ✓ Ireland
- ✓ Thailand

Structure of Supply Chain

Direct management / operations contracted to third parties

Rhizomes nursery → Rhizomes → Plantation → Harvest and transport

Long term leases

External labs → Micro-propagated

Ethanol plant

External farmers → Straws/Woodchips

Spot contracts, longer terms agreement, where available.