

Growing a Renewable Energy Crop with Biosolids

BCWWA May 2006

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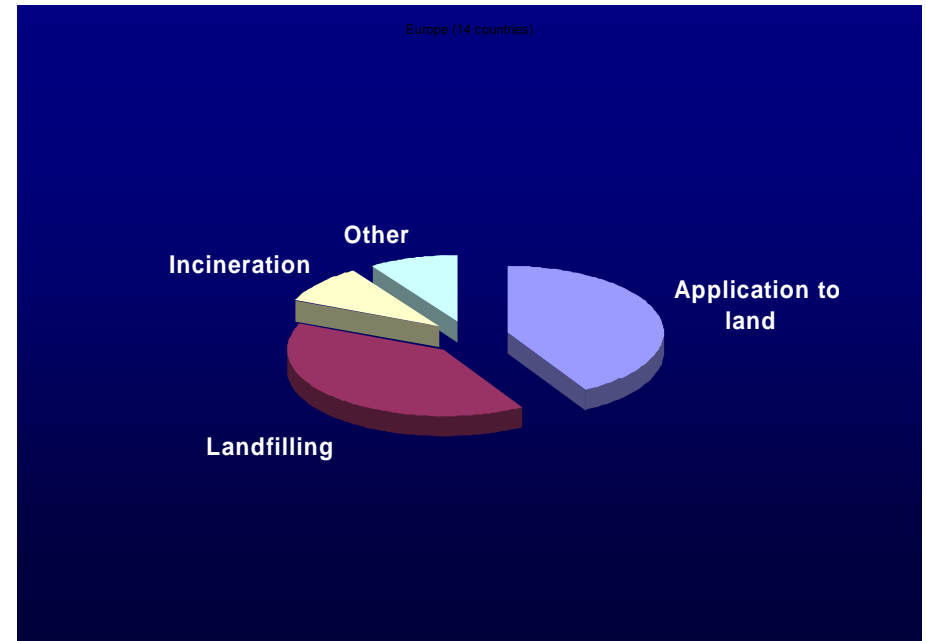
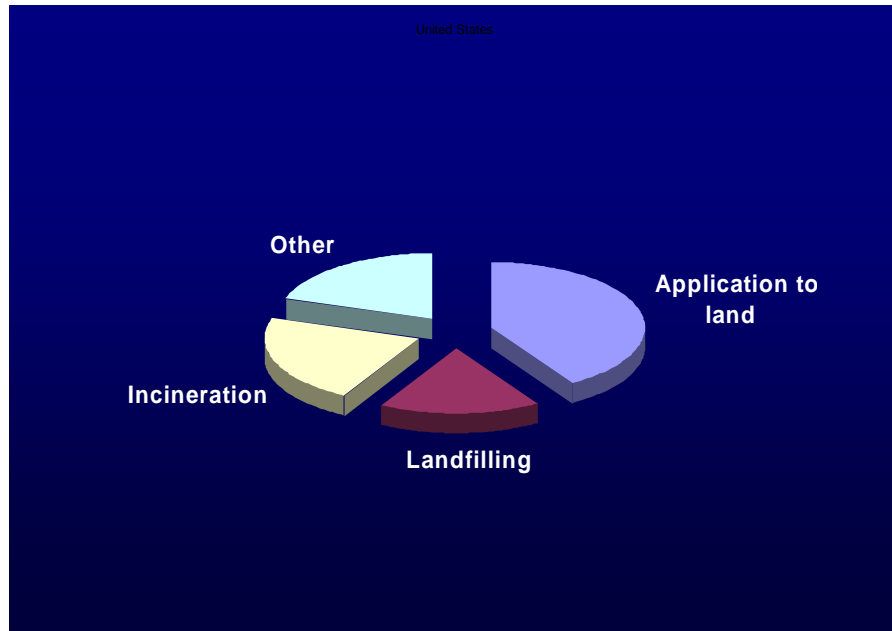
Need for Alternative Biosolids Disposal Routes?

- More Biosolids
- More Regulations
- Pressure on Existing Outlets

Existing Disposal Routes

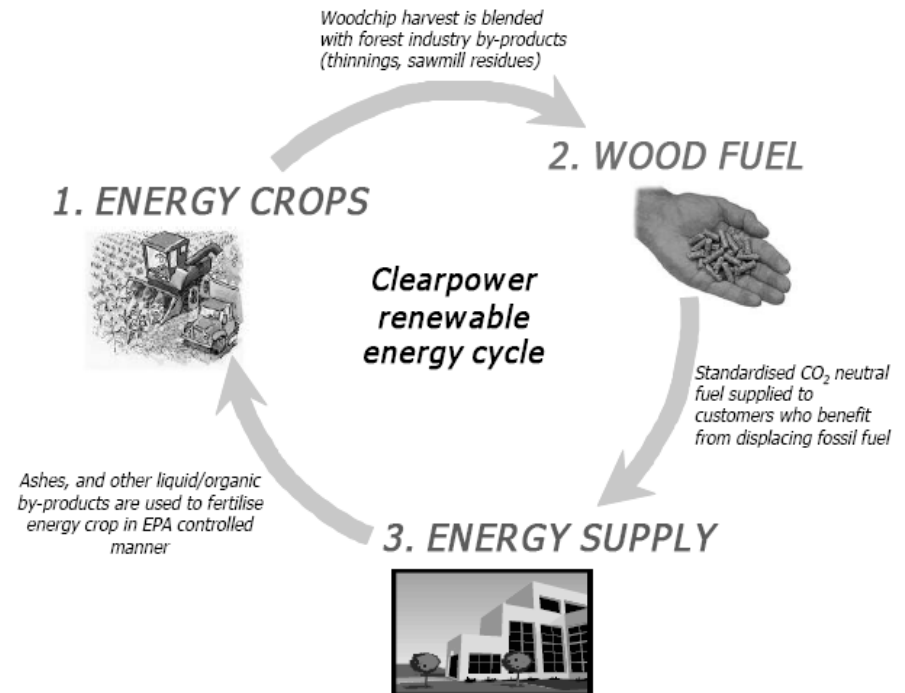
USA

Europe



Short Rotation Energy Forestry

- **Trees are grown as an energy crop**
- **Reduces greenhouse gas emissions**
- **Alternative crop for farmers**
- **Sustainable alternative to fossil fuels**



Biosolids already being used successfully in forestry



Poplar Plantation in Lower Fraser Valley

Advantages

- Outside Food Chain
- Increases Yield of Wood

Challenges

- Spreading sludge during growing cycle
- Build up of metals

Forestry for lumber, pulp & paper



These trees are on a 10-15 year cycle

Then they are harvested.

Then you need to replant.

Forestry for Energy



- **Tree regenerates after harvesting:**
- **No need to replant**
- **Shorter cycle (3 – 4 years)**
- **Easier and more frequent application of sludge**

Why no need to replant?



Coppicing:

- It is the art of cutting of trees and shrubs to ground level allowing vigorous re-growth and a sustainable supply of timber for future generations.
- **Trees regenerate** – no need to replant

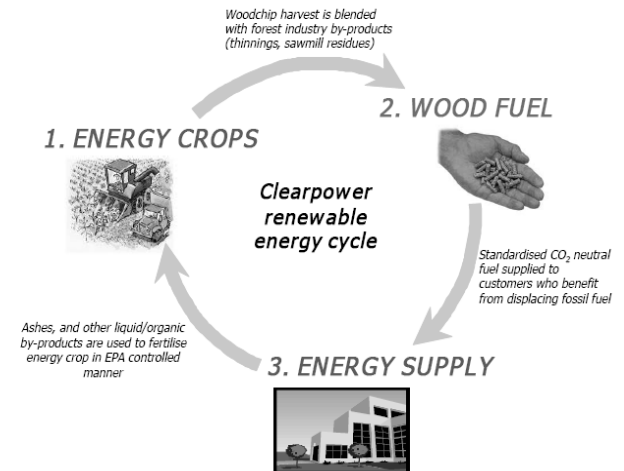
What species are being used?



- **Willow**
- **Poplar**
- **Eucalyptus**
- **Any fast growing species**

History of Forestry for Energy

- Pioneered in Sweden in 1980's
- 15,000 ha established in Sweden (area of Salt Spring Island)
- Utilise 10% of national biosolids production
(100,000 tonnes of sewage sludge @ 20% ds applied. GVRD currently produce 70,000 tonnes)



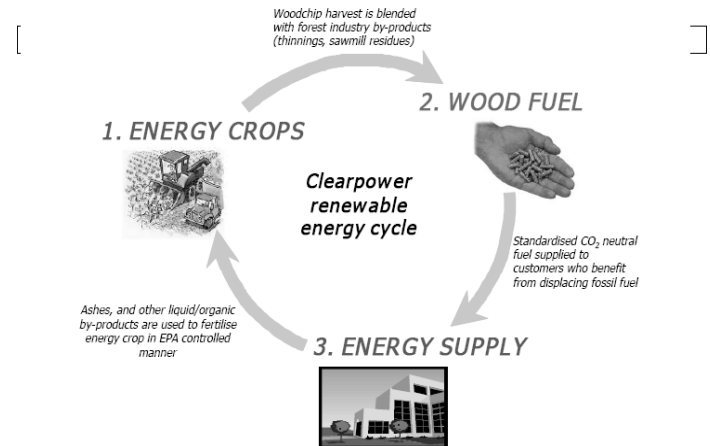
Sweden's Experience

- **Special Cultivars Developed**
- **15,000 plants per ha**
- **Biomass production : 10–15 t DM/ha/y**
- **Special planting & harvesting machinery developed.**
- **Energy Produced : \$0.03 / kw hr**



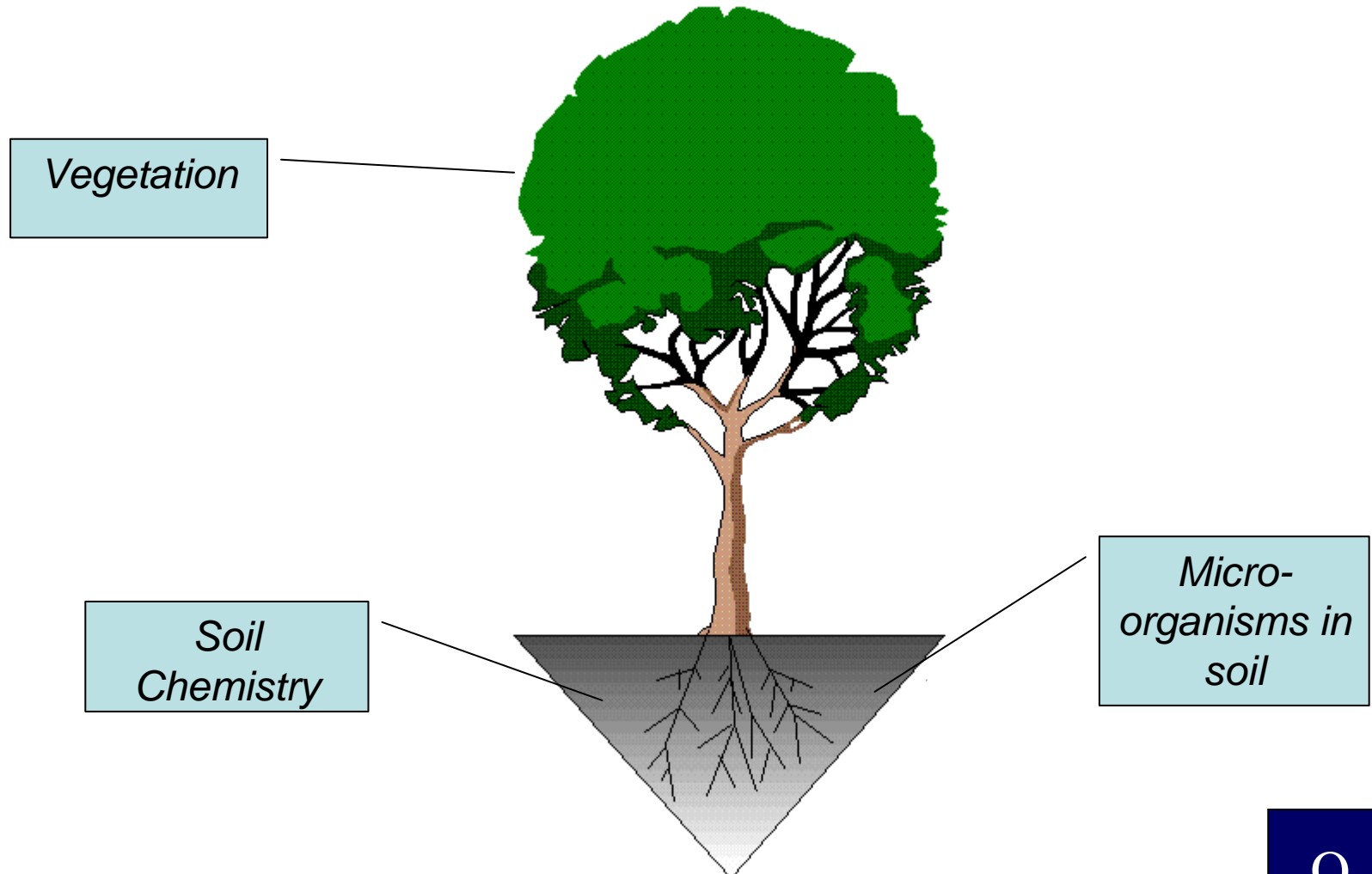
Nutrient Requirements

- **Similar to conventional crops:**
 - 15 kg P / ha
 - 50-75 kg N / ha
 - 25-40 kg K / ha
- **Higher water demand than conventional crops**



Short Rotation Energy Forestry

- a natural treatment reactor



Metals Build up?

- Problem encountered in early years
 - Embarked upon source control initiatives
 - Extensive research on distribution pattern of metals in willow plant
 - Uptake rate of metals can be higher than amount applied when application rate balanced with P requirements

Pathogens!

- Risk of spreading infectious diseases to man via animals?
- Three full scale wastewater irrigation facilities investigated in Sweden
 - No increase of pathogens in animal droppings
 - No increase of pathogens in animal organs
(rabbit, hare, pheasant, roe deer, fallow deer, mink, fox and badger, shrew mouse, wood mouse & house mouse).
 - Parasites found could be referred to natural parasite burden

Summary

- **Energy Forestry : *A crop on a 4 year cycle***
- **Produces a carbon neutral energy crop**
- **Sustainable outlet for biosolids outside food chain**
- **Useful part of an overall Biosolids Strategy**

The future?

- Resource Efficient Agricultural Production (REAP) Canada – research on Switch grass
- Reported that Southern BC has the highest potential productivity (10-15 t DM/ha) in Canada
- Growing Interest in Bioenergy crops due to rising energy costs
- Good potential synergy between Biosolids Management and Energy Crops.

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