Agroforestry & Woodlot Extension Society -AWES

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Opportunities, Process and Challenges

- Opportunities
- Process
- Challenges
- *My presentation is focused on small to medium size wood biomass heating systems – nothing to do with electricity nor larger then 5 MW plants*

Look familiar ? Source of wood biomass !!!

Germany's largest pellet heating system
The recreational park CAMBOMARE, Kempten (Germany)
heated with the PYRTEC® 1000 from KÖB

Double Boiler System (PYRTEC® 1000 and PYROT® 540) are heating the 257,000 sq ft Congress Center, Brunstad (Norway)

Central Heating Plant

Harney District Hospital, Burns OR
Container System

KÖB
Wärme aus Holz

Pyrot 150 kw
Fuel: Pellets

Structurlam Products
Penticton BC.

KÖB
Wärme aus Holz

Pyrot 300 kw

Fuel: Wood Chips

Island Hothouse Inc.
in Ladysmith BC - Canada

KÖB
Wärme aus Holz

Output: 1000 kw
Infeed: Walking Floor
Fuel: Chips

University of BC

Madsen Cabinet Maker - Edmonton…

Camrose County

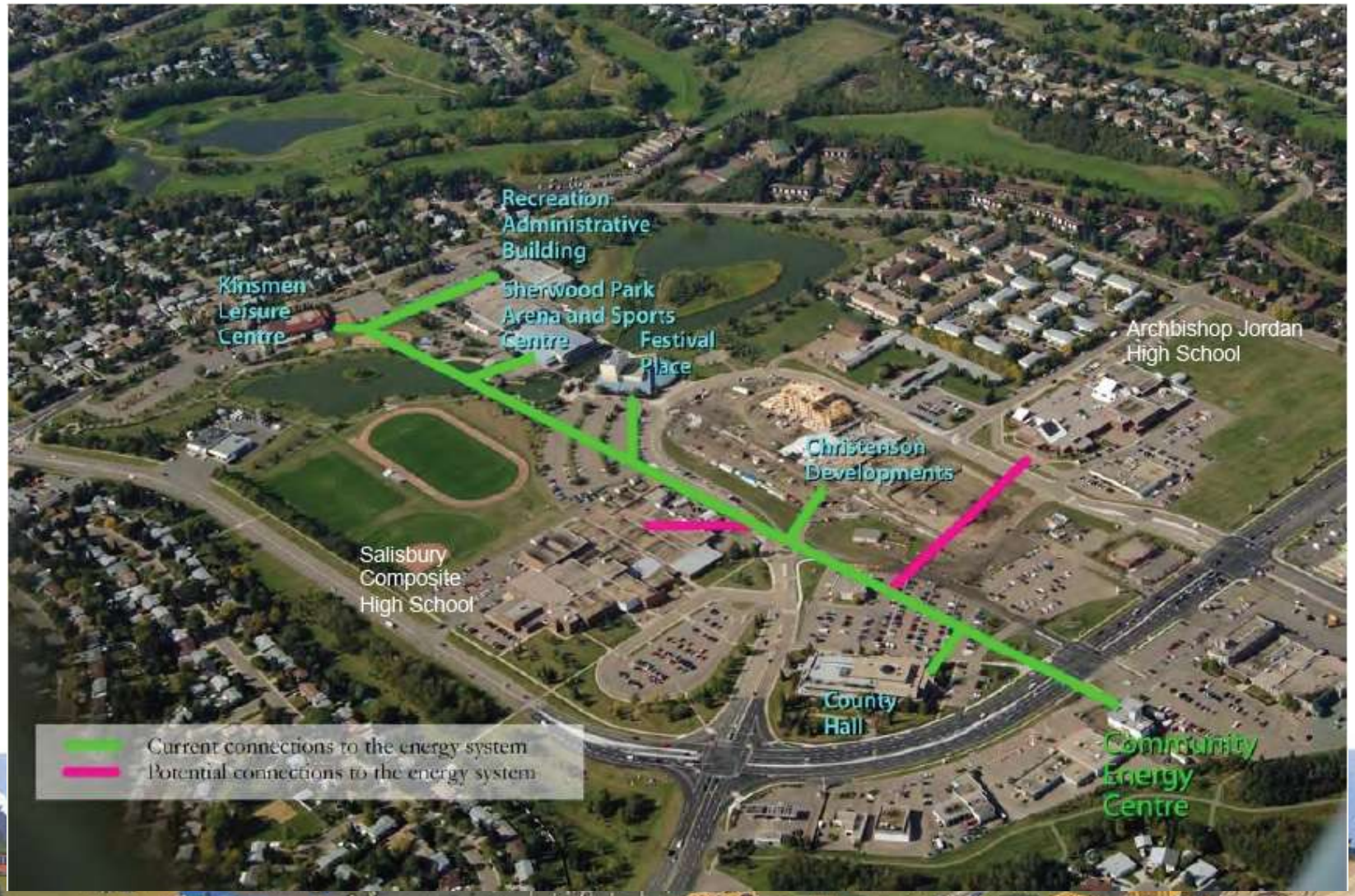
Camrose County bioenergy project

- 155 KW
- Total cost of project $220.000
- Office space 32,000 sq feet
- Return on investment -7 years

Strathcona County DHS

LAMBION SYSTEM
Output: 900 kW
(3.1 million Btu/h)
Fuel: Waste Wood & various
Straw Pellets

Strathcona County DHS



Strathcona County DHS

Mobile Fuel Storage

Energy value

Carbon Basics
- Energy content and CO2 emissions

Fuel	Energy (GJ/t)	Carbon emission (g CO2/kWh)
Wood	19-21 (oven dry)	400
Natural gas	41-52 (37 MJ/m3)	200
Oil	43	270
Coal	31-32	1 080

Sources: http://cdm.unfccc.int/UserManagement/FileStorage/FS_57235327
http://hypertextbook.com/facts/2006/LunChen.shtml
Wood Fuels Basic Information Pack

Things to consider for wood bioenergy for your business!!!

- Technology
- Wood Supply
- Financial aspect
- Environmental Issues
- HR

Appropriate Technology

- Search for most appropriate technology considering project location and fuel supply
  - »Ability to convert local fuel supply into heat/power
  - »Must meet local permitting specifications
- Technology must be proven:
  - »Commercially available
  - »Operates efficiently on available fuel supply
  - »Operates cleanly on available fuel supply
  - »Appropriate for site and local resources

System and ash collector

Technology

- Mostly European technology is not known here
- European systems are more expensive but more reliable and proven to work
- Services - Very few dealers in Alberta for wood biomass technology
- In case something goes wrong – who will come and fix it.. Your gas furnace is broken you know to whom call … to whom you will you call in case of wood boilers
- North American technology is way behind, very little research done, not proven and many cases not modernized
- Few pilots projects – still learning curve
- No infrastructure in support – parts and HR
- Needs for training
- There are a lots of sellers **BE VERY AWARE WHAT YOU ARE GETTING INTO – ASK LOTS OF QUESTION AND VISIT FACILITY THAT IS WORKING FOR LONG PERIOD OF TIME**

Wood supply consideration

- You must have long term contract with steady and consistent supply -few suppliers
- Each system requires various specification on wood supply
- Storage system for wood- eg, shed, bins, walking floor, etc
- Cost –cheaper wood means cheaper GJ

Wood Biomass characteristics

- Feedstock source – directly from forest, home waste, waste from sawmill, burnt wood, and others
- Location and concentration
- Form and size (eg, size of woodchips, pallets, bark, sawdust, etc etc
- Moisture content
- Energy and ash content
- Processed charecteristics

Storage

- Need to know how much wood and space you need it
- Moisture content important – freezing issues
- Contamination – by dirt, rock, chains, nails etc

Transportation

- Highest cost for bioenergy project
- Haul energy not water
- Load and unload system
- Load size and moisture content

Why comminute or compact?
High transportation costs

Transporting a low-value, low bulk-density material with a high moisture content over a long distance

- Importance of maximizing payload through comminution and compaction

Photo Credit: Holman - John Deere

FPInnovations FERIC

Blowing of chips

- blowing capacity is about 2 m^3 per minute
- dust free
- maximum distance is 50 meters
- maximum height 20 meters
- Net load volume 28 – 36 m3

METLA

Camrose -Fuel handling

Wood supply

- Myth – free wood supply – such a thing does not exist
- In conventional gas supply – we have very developed and efficient supply chain while in wood bioenergy some bits and pieces but not efficient and proven supply chain…
- Lack of infrastructure in certain area of province
- Quality is an issue : size of particles, moisture, not uniform supply
- Steady supply of quality and quantity – do we have it ?? Try to find somebody to deliver wood in short period of time
- Price – variable, unpredictable and all over the place
- WHO CONTROLS WOOD SUPPLY – very important thing and sometimes very tricky thing to have a control

Wood supply continue

- Storage – space, issues with freezing, fire and transport to facilities – how many steps from storage to system – could be very tricky
- Space for wood bunker, bin or other system
- System to fill up bunker – air blower, auger, etc
- Frequency of filling up storage and maintenance of storage
- You may need to have a year supply as back up – needs additional space
- Additional cost of building storage and equipment need to move wood supply
- Do you need extra equipment –eg wood chipper
- And all cost of wood supply must be comparative with natural gas which is less headache

Environmental needs

- Current regulations – lack of it
- Smoke and other emission issues
- Carbon credits potential
- It is renewable and green energy
- All environmental benefits are given

“Smoke”

Environmental issues

- Carbon credit market exist but process and long and costly
- Public perception about smoke and emissions
- Ash disposal can be an issue
- What is really Carbon foot print in renewable energy ??
- Emissions can be the result of:
  - complete combustion
  - incomplete combustion
- Emissions are influenced by:
  - combustion technology
  - process conditions
  - fuel properties –mismatch of fuel with system requirments

Financial consideration

- **There is NO competition with World market price**
- **Locally controlled –supply, and end user**
- **Less hassle with Regulations –eg. electricity**
- Most of projects that I work is less then half million dollars – easier to get money then for multi million dollars projects
- Most of work and $$ stays in community – eg wood supply, system operating, labour, etc
- There are many government grants available that support projects like this
- ROI in most of the project 5-8 years
- Put bioenergy into prospective with other projects in your area– eg one mile of building rural road is around $ 200 K and most of communities put many miles –

Financial issues

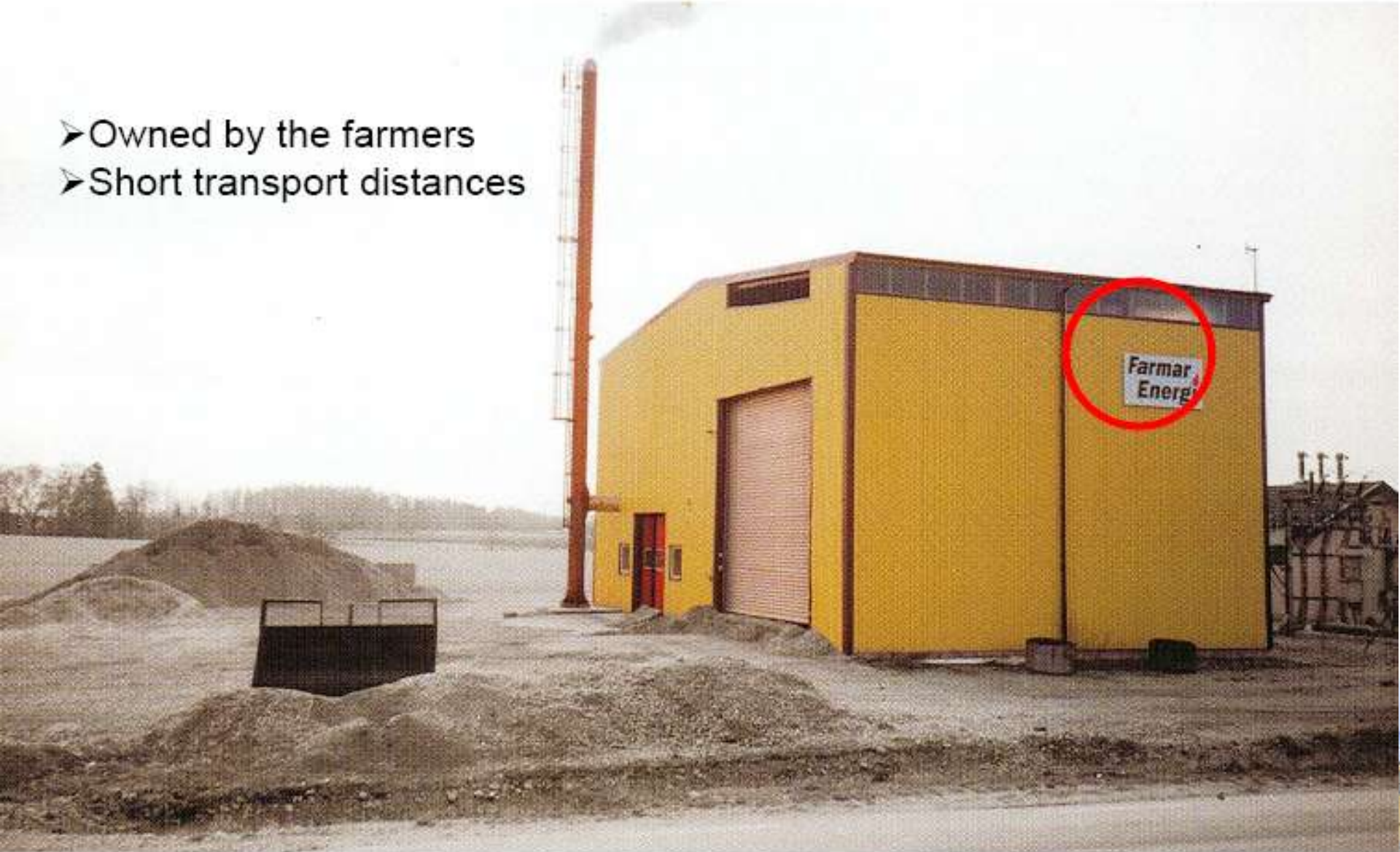
- Most of local financial institutions knows very little about financing bioenergy project
- Many projects are driven by emotions not really by real business scenario
- Financial plan must include following details:
  - Equipment and installation cost
  - Feedstock supply cost and analysis
  - Marketing plan or in many case many years contract from buyer
  - Financing Plan
  - Grants and Permits SECURED
  - 2 year detailed budget
  - Cash flow projections
  - Executive summary
- As one finance officer said to me " nothing worse then people come with great idea and no clue about financial aspect of project"

Human Resources

- Lots of people are interested in renewable energy projects – it is kind of sexy
- In some cases requires very little training
- People are eager and keen to learn about it
- Some institutions are starting to provide educational courses
- Project manager with skill and knowledge is required
- Find a best person that will run wood bioenergy project successfully

Small scale rural production

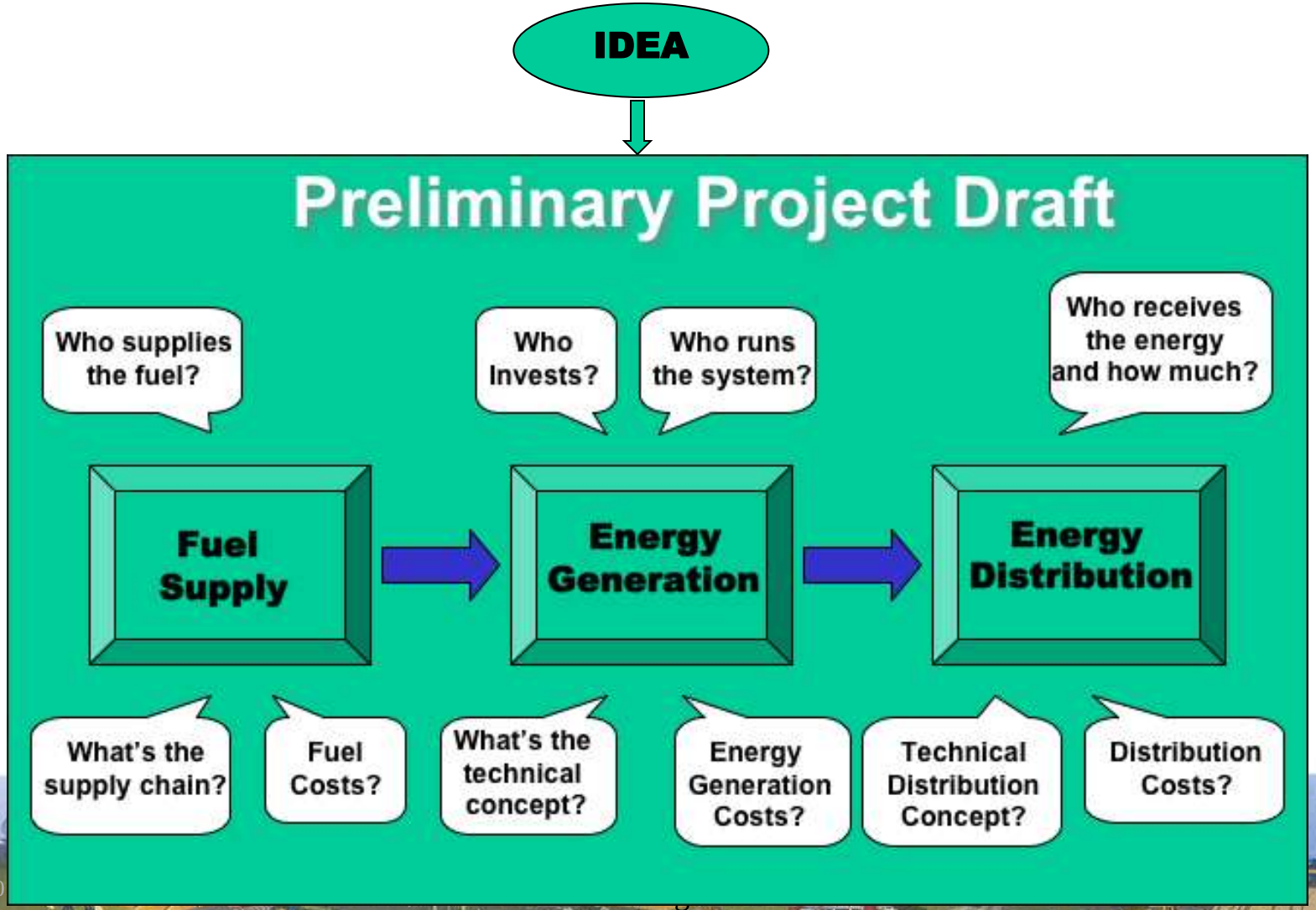
- Owned by the farmers
- Short transport distances



HR issues

- Unfortunately many bioenergy projects are given to people that has very little or no knowledge about all aspect of project
- TIME – seems to me everybody doesn't have a time beside their regular work
- Training is still inadequate for operators, suppliers, builders, codes, permits, etc
- Political leaders gets very exited while administration doesn't' care or in some cases will do everything to stop project – more work
- Somebody has to fill up application for grant
- Financial Dept said – " what are talking about –what bioenergy ??? We are fine with current system –we don't have money for experiment "
- Financial Dept said " show me a bottom line – cut a chase about environment "

Process !


IDEA
Preliminary Project Draft
Who supplies the fuel?
Who Invests?
Who runs the system?
Who receives the energy and how much?
Fuel Supply
Energy Generation
Energy Distribution
What's the supply chain?
Fuel Costs?
What's the technical concept?
Energy Generation Costs?
Technical Distribution Concept?
Distribution Costs?

Pre- feasibility study

- I can cover cost of doing in up to $ 5000.00
- I am looking for communities, food processors, ag business facilities that are large users of heat
- Use of wood as potential source
- Has to really show commitment toward potential project
- I made first cut if possible project make sense
- I can hire consultant to do pre-assessment

Pre- Assessment will cover

- Project site details including : evaluation of current consumption – 3-5 years, evaluation of current system, etc
- Proposed system including: cost, size, space needs, etc
- Fuel supply including: fuel storage, tonnes of wood, type of wood chips, etc
- Economic calculation includes: cost of installing, cost of piping, maintenance, ROI, labour cost and other cost
- Environmental assessment will include how much carbon credits you will be able to claim per year
- Regulations: Permits need it for project

Summary

- Technology is available but pay attention on details and buy what fits your needs and requirements
- Look what best renewable resource are available at lowest cost
- Look in long term energy supply for your facility-
- Initial cost might be high but in long term ROI is very promising.
- Visit already business that are using wood boilers or systems in their operations
- Human resource – educate and have a knowledgeable people about bioenergy project
- Get finance in place and treat as business and nothing else then business
- **If doesn't make sense to you –don't do it**

For more information

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Thank you !!