Forest Fuels
How can they keep Wheels Turning?

John T. Karakash
Suez Energy Northumberland Cogeneration
Energy to heat and cool public buildings and industrial process

Or Wood to WASTE
Production and Fuels

- Net Electricity Capacity: 15.8 mW
- Energy delivered, daily
  - 388,000 kwh to PPL system
  - 200,000 lbs steam to Furman Foods, Inc. and Tuckahoe Fire Department

- logging residues,
- forest improvement cuttings,
- debris from land being developed,
- trimmings from rights of way and residential yards,
- sawmill residues and
- clean recycled wood
Suez Energy Generation, North America

- Owns and operates 58 North American power facilities
  - Stand-alone electricity production
  - Industrial steam for process
  - History of District heating and cogeneration
- To 746 MW each. Fuels include natural gas, lignite, coal, waste anthracite, petroleum, and wood biomass
  - Wood: biomass to electricity, 7 facilities 15-20 MW
  - Wood: biomass to industrial steam, 6 facilities, ranging to 140,000 lbs steam per hour serving textiles, furniture, paper and pharmaceutical processes.

Suite 1900
1990 Post Oak Boulevard
Houston, TX 77056
713-636-0000
The Questions

- As in Journalism, but in a different order:
  - What
  - Why
  - How
  - Who (can we learn from)........................., and for us,
  - WHEN and HOW to implement in the US?
Commit now to **apply** benefits of **Quality of Energy** “Type Differences”

Build understanding that “*Energy is what energy does ……….*”

Begin to **act** on fact that thermal constitute *nearly one third of American Consumption of oil and natural gas.*

Begin displacing oil, natural gas and electricity used for heat and chilling applications with clean, available systems fueled by wood and other biomass.

- Frees available fossil fuels for transportation, manufacturing,
- Extends power grid capacity (cooling),
- Improves forests
- Employs local people

![US Oil Use by Sector, 2005](image)

**The What? Question**
What do we hope to accomplish?

• Establish links between the known and the needed.
  – Energy, forest health, resource availability, wildfire protection, climate change, jobs and training, foreign trade.

• Increase dialog among professionals in disciplines normally seen as unrelated. Foresters, (HVAC, CHP, Design), administrators in business, health care and education.

• Support technology transfer
  – potential users, (institutions and industry), service sector, landowners and forestry and logging professionals.

These concepts were part of the ROADMAP!

“What roadmap”? 
December 2002 DOE Publication acknowledged potential, yet downplayed points most helpful to silviculture and community energy in most of the US:

- immediacy,
- market proximity,
- quantity, and
- scale,

which mean affordability at local level.
THIS IS

NOT *Modern* Wood Thermal Energy

Outdoor Wood Boiler Photos from BurningIssues.org
What IS Modern Wood Thermal Energy – by examples

The
Who ?
Question

• Suez Energy operates 11 wood fired facilities for electricity, CHP or industrial process.

• Mountain View Elementary, Warren State Hospital, Barron schools, Fuels for Schools and Beyond, many more, OPERATING in PA and across the US

• University of Idaho, Moscow, City of Akron OH, Charlottetown, PEI, Univ. South Carolina, Columbia (new)

• Federal approach to biomass for their own facilities

• Energy Cabin, Güssing, Neckenmark and Simmering, are examples OPERATING in Austria
What is the potential?

• At a rate of:
  • 1 SMALL project per county per year
  • For 5 years (average construct time 6 mo.)
  • Where small is defined as 2 “loads” or 40 tons., 750 bhp

• The result in year seven (all operating)
  • 349,780,000 gal. oil or nat gas equiv. not used
  • 3,917,892 Tons fossil CO2 mitigation effect
  • $65,794,000 savings after equip. and labor paid off
Some examples of wood for energy
With Similar Low Use Wood
Use wood chips to keep this small town warm
Heating with wood fuel saves > 90,000 gallons oil/year (> $$120,000/year or $80 / student)

A 1987 Pennsylvania Example:
Mountain View Schools, 1500 students
Energy Cabins - modular high-tech wood - solar heating and cooling in modular packages
Tuckahoe Fire Department
Eco-energy tourism brings visitors... to a new hotel in Güssing
To see modern energy systems
Wood @ 40% MC 100,000 tons

Compare savings for the **same quantity** of clean heat from wood, fuel oil and natural gas.

**Why thermal and DE / CHP are viable today**

<table>
<thead>
<tr>
<th>Estimated Costs/unit (*3)</th>
<th>Estimated Total Fuel Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>ns $ 29.00 per green ton</td>
<td>$2,900,000</td>
</tr>
<tr>
<td>ns $ 2.00 per gallon</td>
<td>$15,835,294</td>
</tr>
<tr>
<td>CF $ 11.00 per mcf</td>
<td>$12,941,177</td>
</tr>
<tr>
<td>CF $ 13.00 per mcf</td>
<td>$15,294,118</td>
</tr>
<tr>
<td>CF $ 20.00 per mcf</td>
<td>$23,529,412</td>
</tr>
</tbody>
</table>

Comparative cost, same heat quantity based on 100,000 tons of green wood

Savings Potential
2006 figures
From US DOE eia reports
The Why? Question
Forestry Bio-Energy Connections

- Forest Health Needs and Residue Utilization
- Local Jobs and Economic Security
- Local Energy Needs and Environmental Benefit
- National Energy Security and World Standing

The Why? Question
12 million people, 44,820 sq. mi.
62% forested, 16+ million acres forest

6 million sustainable tons with a big IF

The Why? Question

Core Forest of Pennsylvania
Concerns of Public and Resource Professionals

- Unsustainable overcutting
- Missing local benefits (not lowering local costs or improving local environment)
- Long delays, high risk
- Cyclical markets
- Money leaves area
- Few jobs for local people
Why Size Matters – A Comparison

Big projects – (Silver Bullets, assuming demonstration of feasibility)
• Excess cutting near projects is probable,
• Overlapping buying circles will increase competition, and limit number of installations,
• High freight costs from distant sources will limit profits,
• High finance costs, permitting and construction delays increase risk, limit local community and logging crew interest

Small to Moderate projects – (Golden Buckshot, already demonstrated to work and be financially viable)
• Cumulatively, have more impact, greater financial return and benefits to environment, *statewide* employment, and grow quickly by example.
• Local citizens help select projects to match their needs and resources through several iterations.
• Allows limiting of use to sustainable resource levels at next stage,
• Rapidly permitted and constructed,
• Generates hundreds of locally based value chains across the Commonwealth, quickly.
• Can be locally financed, money stays in local economy

The How? Question
Type and size of project will determine fuel availability and success. Bigger is not likely better.

The How? Question

Freight expensive zone

Freight neutral zone

Freight low zone

Forest of Pennsylvania

Forest Patch Size Classes

- 0 - 100 Acres
- 100 - 500 Acres
- 500 - 1,000 Acres
- 1,000 - 5,000 Acres
- 5,000 - 10,000 Acres
- 10,000 - 60,850 Acres
- Ecological Regions
In a Different but Similar Place

8 million people, 32,378 sq. mi., 47% forested

12 million people, 44,820 sq. mi., 62% forested
A two decade trend continues successfully
Why look at Austria?

Growth means Changing Attitudes!
Austria : district heating systems based on biomass are in progress.

- 15 years ago [1997 document] Austria started a programme to install district heating systems in villages and towns in the rural districts. This programme proves to be very successful.
- Every year many new systems are being implemented. Private investors such as sawmills, recently founded co-operatives of farmers and forest owners but also communities and large energy companies invest in these systems. A growing interest in micro-systems is noticeable within the last years. The Austrian government, mainly the Ministry of agriculture, promotes this development by offering investment subsidies.
- In the year 1996, 33 new installations above 1 MW and 214 installations in the range 0,1 - 1 MW were built. All together, at the beginning of 1997, 280 heating systems above 1 MW based on biomass (total installed power : 566 MW) were in operation as well as 2,266 systems in the range 0,1 - 1 MW (total installed power : 635 MW). It is expected that this development will continue within the next years.
- Contact : Johannes Schmidl Austrian Biomass Association fax : + 43 1 533 07 97 90 Email : forum@netway.at

Austria is 66% the size of Pennsylvania
But That’s Over There

• It won’t work here!!!!!!!!!
• Support Ethanol Research, and
• Encourage use of wood thermal and CHP in federal facilities.
Fuels for Schools and Beyond in Pennsylvania?

Provide Guidance for The Next Increment,
Inform the public about Existing Successes

• *Not* trying to change an entire system.
• Displacing the fossil fuel needs of an appropriate new or renovating energy user.
  – For the next school, hospital, industrial steam boiler or district energy system opportunity.
Our Challenge?

• Stop fighting each other. All of our industries becomes a color, texture, in the american energy mosaic.

• Start building now with what we, or others already are doing.

• Energy recovery will require solar, coal, hydrogen, wood, oil, wind, natural gas, baled switchgrass, geothermal, methane, and most of all, conservation / education / efficiency improvement. Build now, keep studying ahead.

• Thank you.