Increasing Heating Efficiency in Rural Alaska

The Facts About Pellet Stoves

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The Beginning of the Project

The Thinking Cap

There are many factors needed to make a decision.

-Thinking what you want.
-Types of homes.
-Finances.
-Personnel
-Time Available
-Variables
-Other factors

The truth about Pellet Stoves

- Wood Pellet Stoves:
  - Are generally small
  - Pellets are easy to store
  - Easy to install and operate
  - Use a hopper to load pellets
  - Only loaded once a day - thermostat controlled

The truth about Pellet Stoves

- The Fire Factor:
  - Fire is contained in a heat box inside unit.
  - Creates minimum smoke.
  - Outside of unit does not heat up as much.
  - Create less ash than firewood.
  - Gives off less creosote – pollutants, burns clean
  - Less potential for fires.

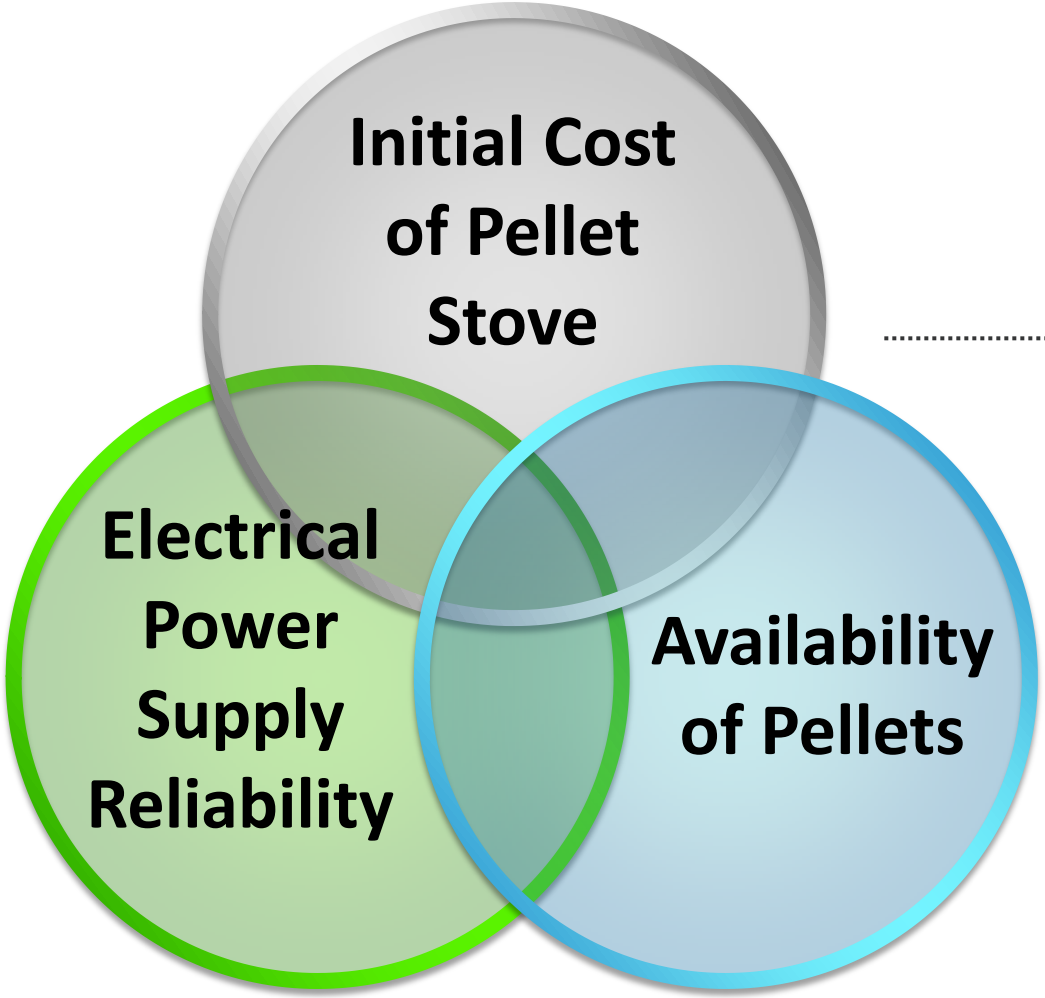
The truth about Pellet Stoves

- Wood pellets can be made from recycled materials – bio mass fuel
- Have lower moisture content due to higher compression of pellets.
  - Dry fuel creates more heat.
  - They burn hotter and cleaner.
- They emit fewer pollutants.
- They are carbon neutral

The truth about Pellet Stoves

- Their DOWN Side……
- Initial Cost – Between $1,700 to $3,000 plus installation cost.
- Need storage space for pellets.
- Pre-made pellets may not be available nearby.
- The stoves run on electricity.

Important Considerations

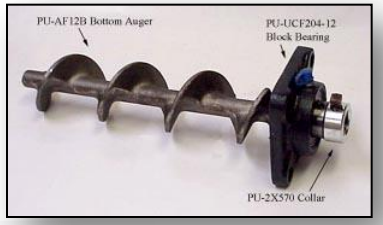


Considersations.

- ✓Private expense or Grants?
- ✓Can I make enough pellets locally?
- ✓How much do they cost to import?
- ✓Do I need a backup Battery source for power outages?

How Do They Work?

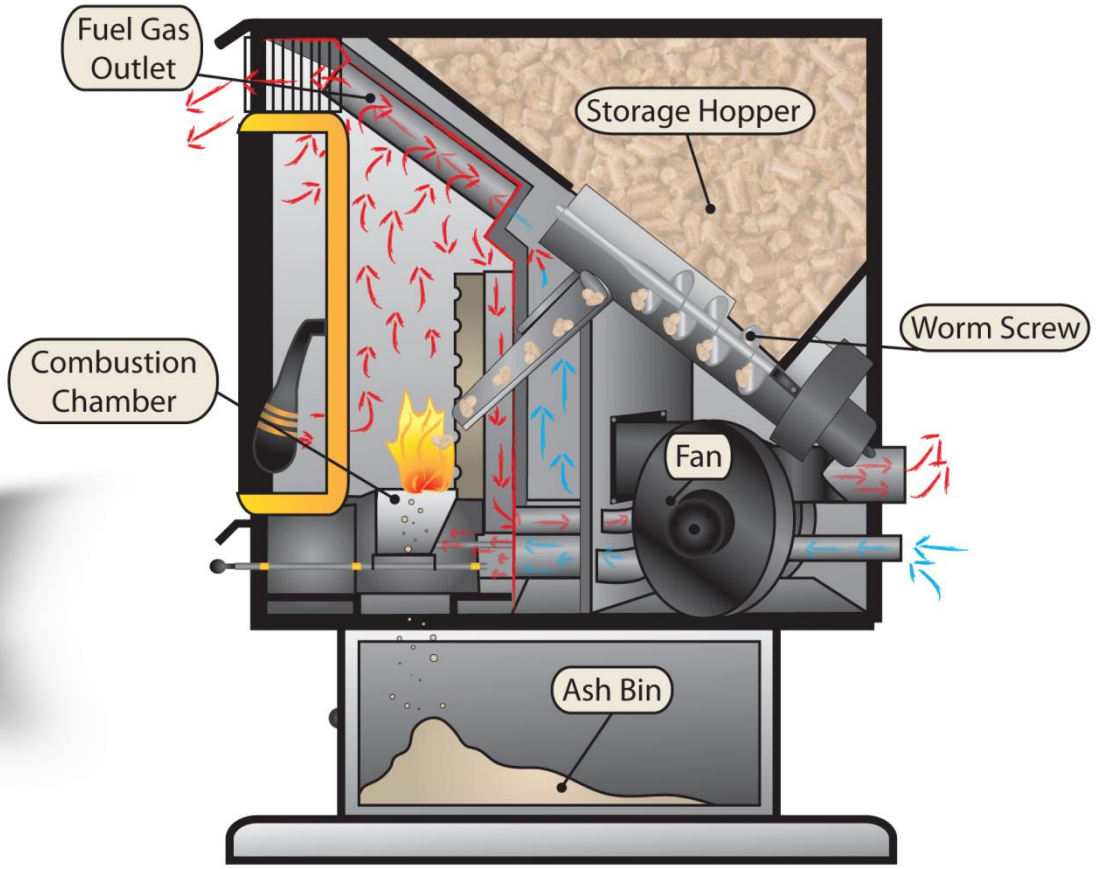
- The pellet stoves run with electricity.
- The pellets are loaded into a hopper.
- A motorized auger (big screw) delivers the pellets into the burn pot.
- The auger's speed determines the temperature of the stove.
  - The faster it turns, the more pellets that are fed into the burn pot.



How Do They Work?

- The burn pot is ignited.
- The pellets are compressed.
- The higher density and lower moisture creates a hotter flame.
- The ashes created are captured by an ash pot.

How They Work



How do they heat the room?

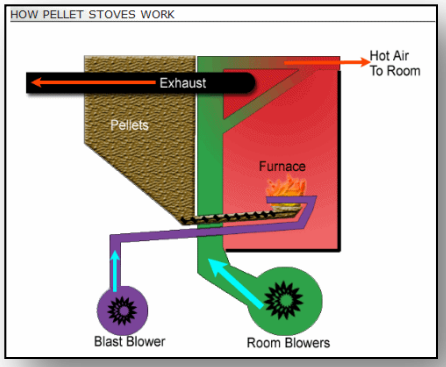
- They heat a room through convection.
- A blower pulls clean room air in.
- Passes it through a heat exchanger.
- And blows the clean heated air back into the room.
- An exhaust blower blows the burned gases out a narrow pipe in the back of the stove and out the chimney.

Controlling the Heat

- It has a thermostat:
- It controls the auger which controls the number of pellets fed into the combustion chamber.
- More pellets equal more heat!

Types of Pellet Stoves

- **Top Feed**:
  - Pellets are fed from the top.
  - Have better heat efficiency
  - Mat clog up with ashes if not cleaned regularly
- **Bottom Feed**:
  - They deliver pellets horizontally
  - Can use lower grade pellets
  - Produce less ash
  - Less efficiency than top fed



Types of Pellet Stoves

- They range in heating range from 8,000 to 90,000 BTU's.
- The majority of models are between 40,000 to 60,000 BTU's.

Manual Versus Automatic?

- **Manual** stoves require a starter liquid or gel starter material to light the flame.
  - Similar to starting a fire in a wood burning fireplace.
- **Automatic** stoves have start buttons with a self-igniter.
  - When you push the button it feeds the pellets into the burn box.

Doing the Math

- To determine the capacity of the stove you need:
  - 5,000 BTU's will keep a 200 square foot of space warm.
  - Check the square footage of the room you want to install it in.

Other Factors:

- Wood pellet stoves are only safe to sit on certain flooring materials.
- Decide the size of the pellet hopper for less frequent re-filling.
- If power outages are common, may need a battery backup…specially during winters.
- Stoves with large viewing glasses or ceramic logs are also available.

Our Project.

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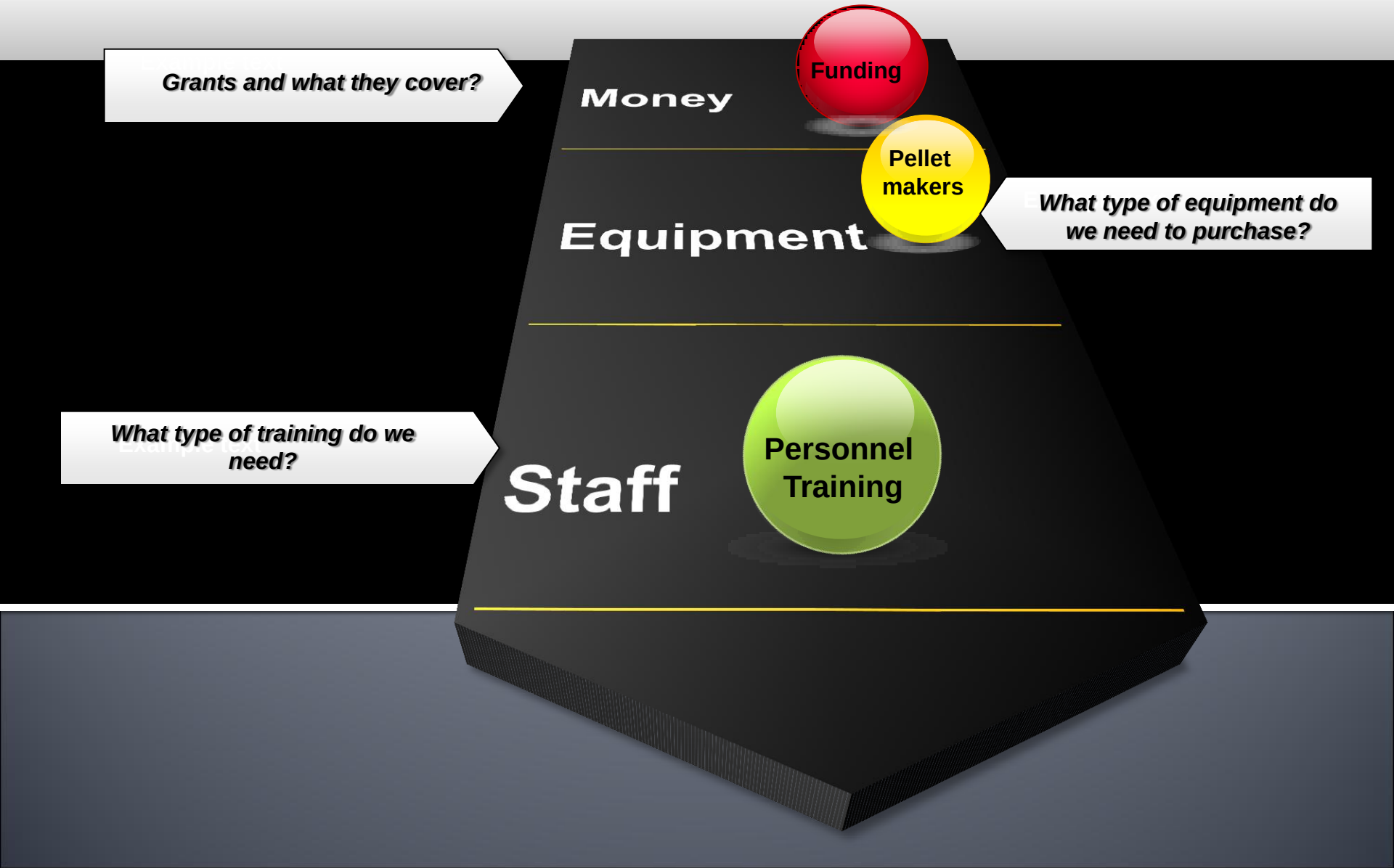
Project Planning:



Funding

- IGAP
- ANTHC Communtiy Demonstration Grant
- American Native Association –ERE
- Collection Fees
- Sale of Pellets

Equipment & Supplies

- Wood Chipper
- Pellet Milling Machine
- Hammer Mill
- Paper Shredder
- Pellet Stoves
- Drill
- Three Phase Power Source
- Storage Containers
- Storage Facility

Budget

- Personnel
- Equipment
- Fuel
- Storage Facility
- Storage Containers
- Electricity

The Process

- Chip wood/shred paper and cardboard
- Put through hammer mill to get ¼" particle with 15% moisture
- Send through pellet mill
- Cool

Production Rate

- 20 lbs. per horsepower /hr.
- 7.5 hp. pellet mill 120 lbs. /hr.

Twin Ports Testing

Product	Test Parameter	As Received	Dry Basis
1. Eastern Coal	Moisture % BTU/lb. Ash % Sulfur %	4.77 13639 5.25 0.76	--- 14323 5.52 0.08
2. Western Coal	Moisture % BTU/lb. Ash % Sulfur %	25.67 9252 4.21 0.32	--- 12448 5.66 0.43
3. Raw Wood Waste	Moisture % BTU/lb. Ash % Sulfur %	39.71 5356 3.16 0.05	--- 8884 5.25 0.09
4. Processed Wood Waste	Moisture % BTU/lb. Ash % Sulfur %	10.37 7447 1.73 0.05	--- 8309 1.93 0.05
5. Wood Pellets	Moisture % BTU/lb. Ash % Sulfur %	2.74 8246 0.43 0.01	--- 8479 0.44 0.01
6. Paper Pellets	Moisture % BTU/lb. Ash % Sulfur %	4.04 10198 3.53 0.06	--- 10627 3.68 0.06
7. Tire Derived Fuel	Moisture % BTU/lb. Ash % Sulfur %	1.05 15278 3.49 1.43	--- 15439 3.53 1.44
8. Peanut Hull Pellets	Moisture % BTU/lb. Ash % Sulfur %	8.58 7830 3.61 0.08	--- 8565 3.94 0.09
9. Grain Dust Pellets	Moisture % BTU/lb. Ash % Sulfur %	12.56 6680 3.73 0.09	--- 7640 4.26 0.11
10. Wild Rice Hulls	Moisture % BTU/lb. Ash % Sulfur %	14.18 7062 4.54 0.11	--- 8229 5.29 0.13

Issues

- Shipping to Rural AK
- Location
- 3 phase power
- Shredding Materials
- Communication

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Questions?