



2009 Residential Wood Combustion Oregon Statewide Survey

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NW-Airquest Annual Meeting,
April 2nd, 2010
Portland, Oregon



- Improvements of 2009 survey over 2000 survey
- Survey results & comparison of activity estimates to previous data

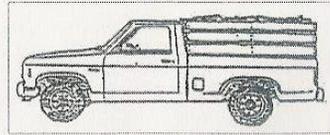


Revisions & Improvements

- ✓ Questions were ordered to more accurately separate “owners” from “burners”
- ✓ More accurate descriptions of cord sizes were provided to interviewers to better inform respondents
- ✓ More completed survey interviews in 2009 than in 2000 (1,036 vs. 856)
- ✓ Survey questions asked in 2009 but not in 2000 include
 - Wood species and variety burned
 - Amount of pellets burned in inserts
 - Detailed questions to differentiate inserts from fireplaces

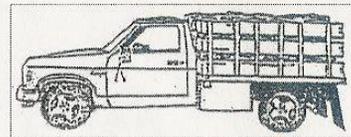


Cord Size



Long Bed Pickup - 1/2 or 3/4 Ton

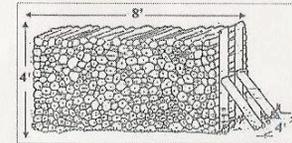
Without racks, this truck bed holds approximately 1/2 cord of firewood. (Approx. 1331 lbs.) With racks, it will hold approximately 1 full cord. (Approx. 2662 lbs.)



Standard 1 Ton Truck

With high racks, this truck bed will hold approximately 2 cords of firewood. (Approx. 5324 lbs.)

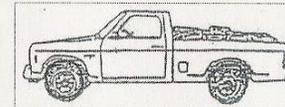
HOW MUCH WOOD WILL YOUR TRUCK HAUL?



1 Cord
(4' x 4' x 8' = 128 cu. ft.)

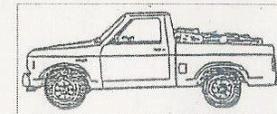
Firewood is commonly measured in cords. A standard cord is the amount of tightly piled wood in a stack 4 feet wide by 4 feet high by 8 feet long. The average half-ton pickup can carry a half cord of dry wood without overloading the vehicle.

These illustrations demonstrate the relative volume of a cord of wood and are not recommendations of how much wood your truck is capable of hauling safely. The weight of your truck haul can be found in your owner's manual.



Small Pickup - 1/4 Ton

With or without racks, this truck will hold approximately 1/2 cord of wood. (Approx. 1331 lbs.)



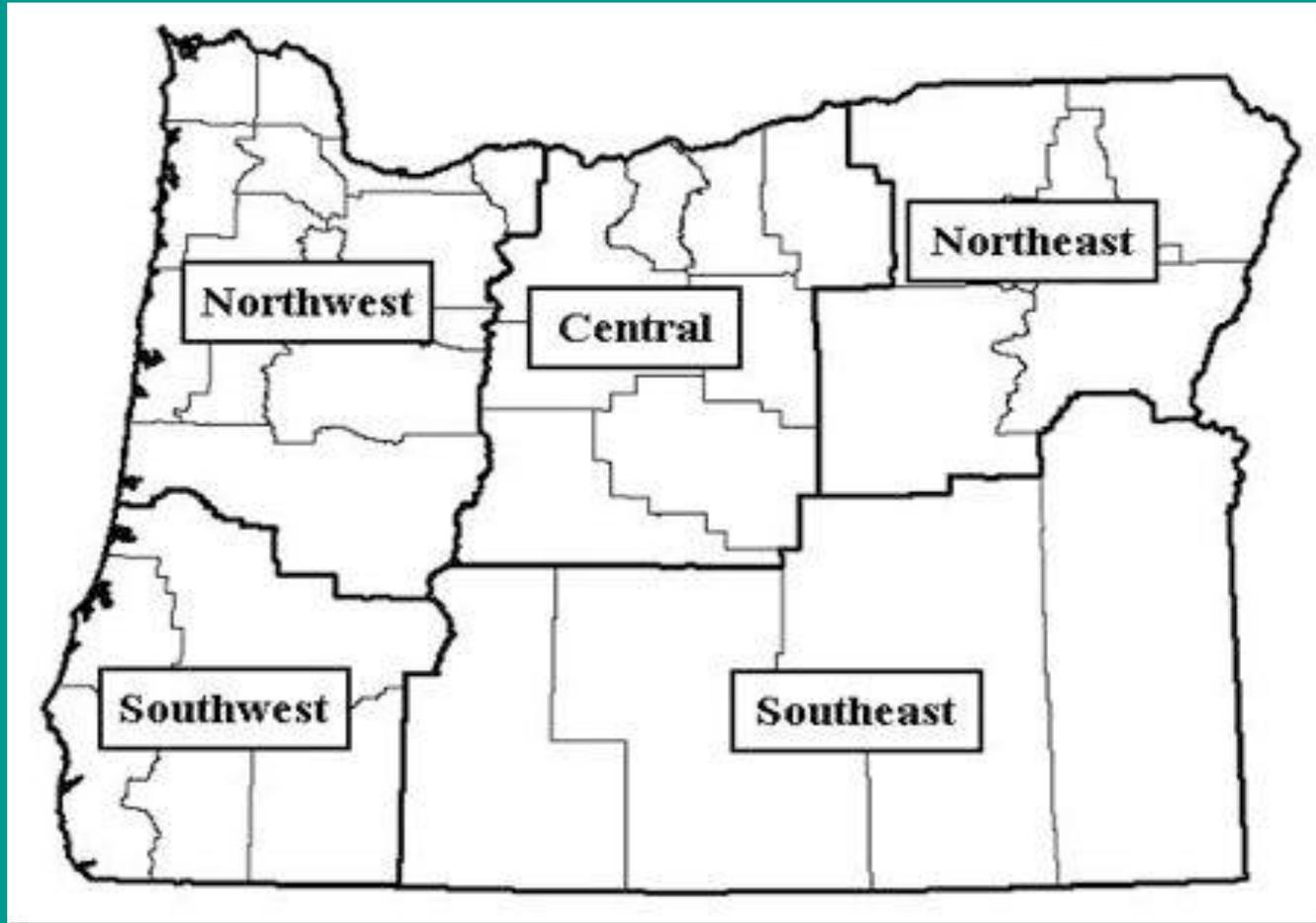
Short Bed Pickup - 1/2 Ton

With or without racks, this truck will also hold approximately 1/2 cord of wood. (Approx. 1331 lbs.)

Thanks to: Betsy Shenk, Interagency Fuels Management Specialist, BLM



Survey Regions



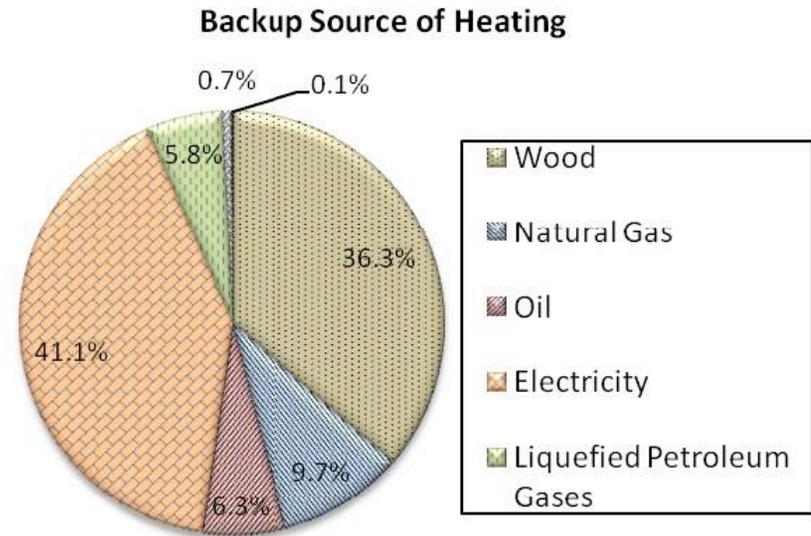
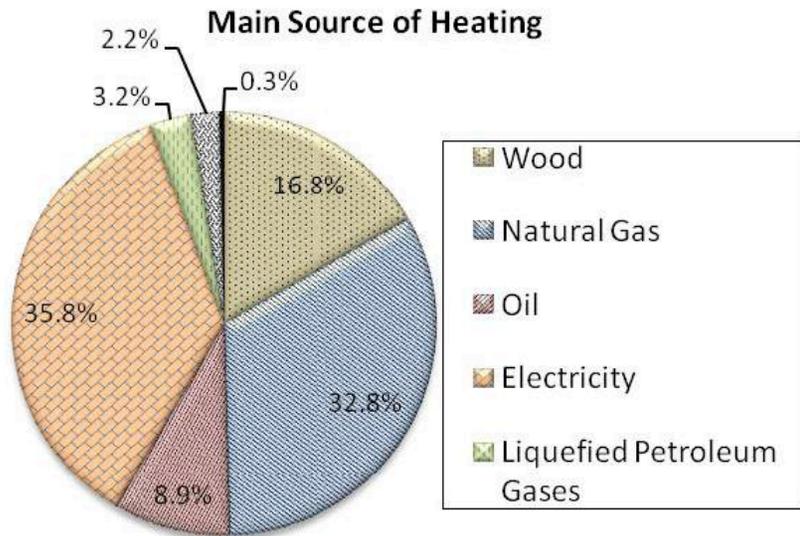


Survey Goals & Actual Frequencies

Region	Goal	Actual
Northwest	176	204
Southwest	176	212
Central	176	198
Southeast	176	209
Northeast	176	213
Total	880	1,036

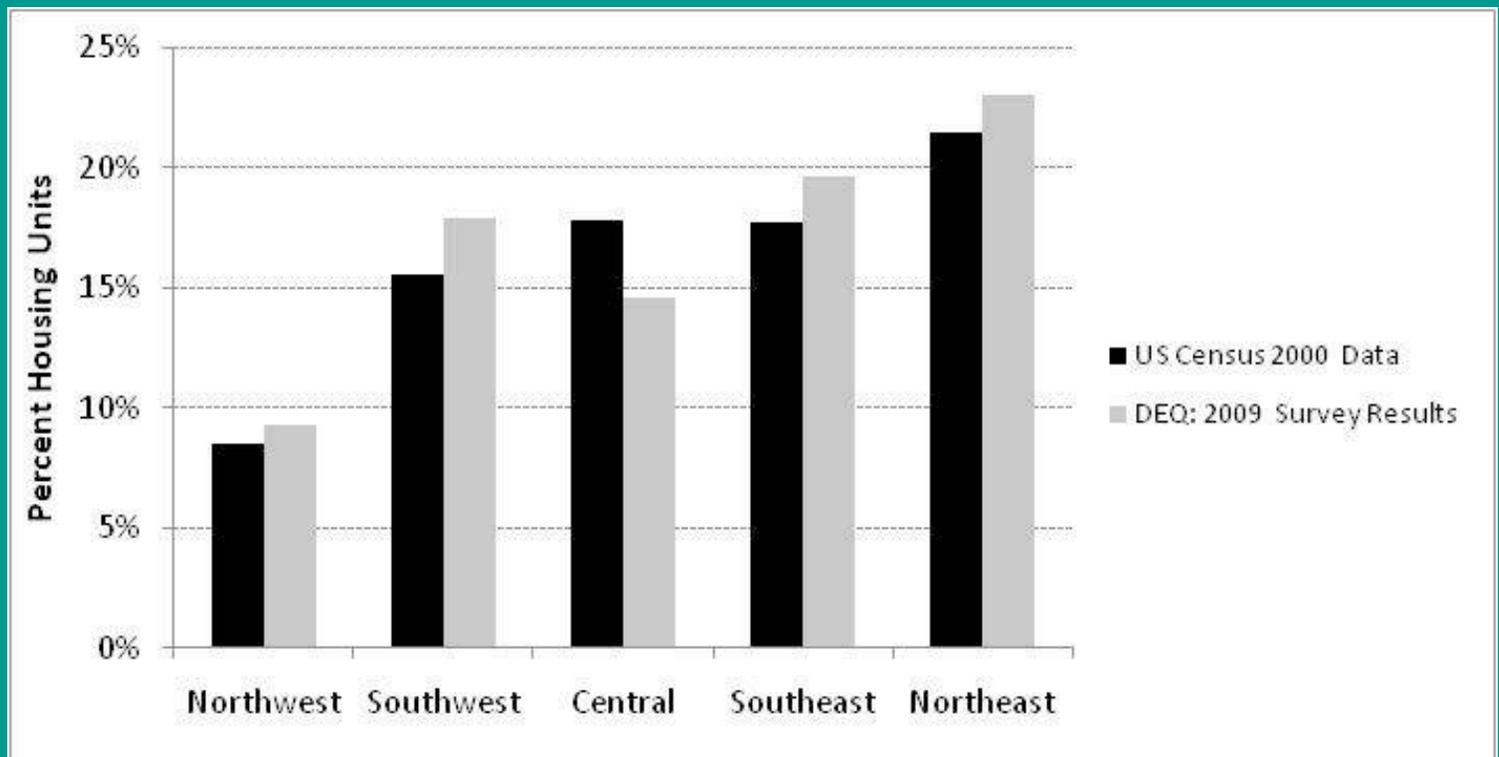


Heating Source: Statewide Totals



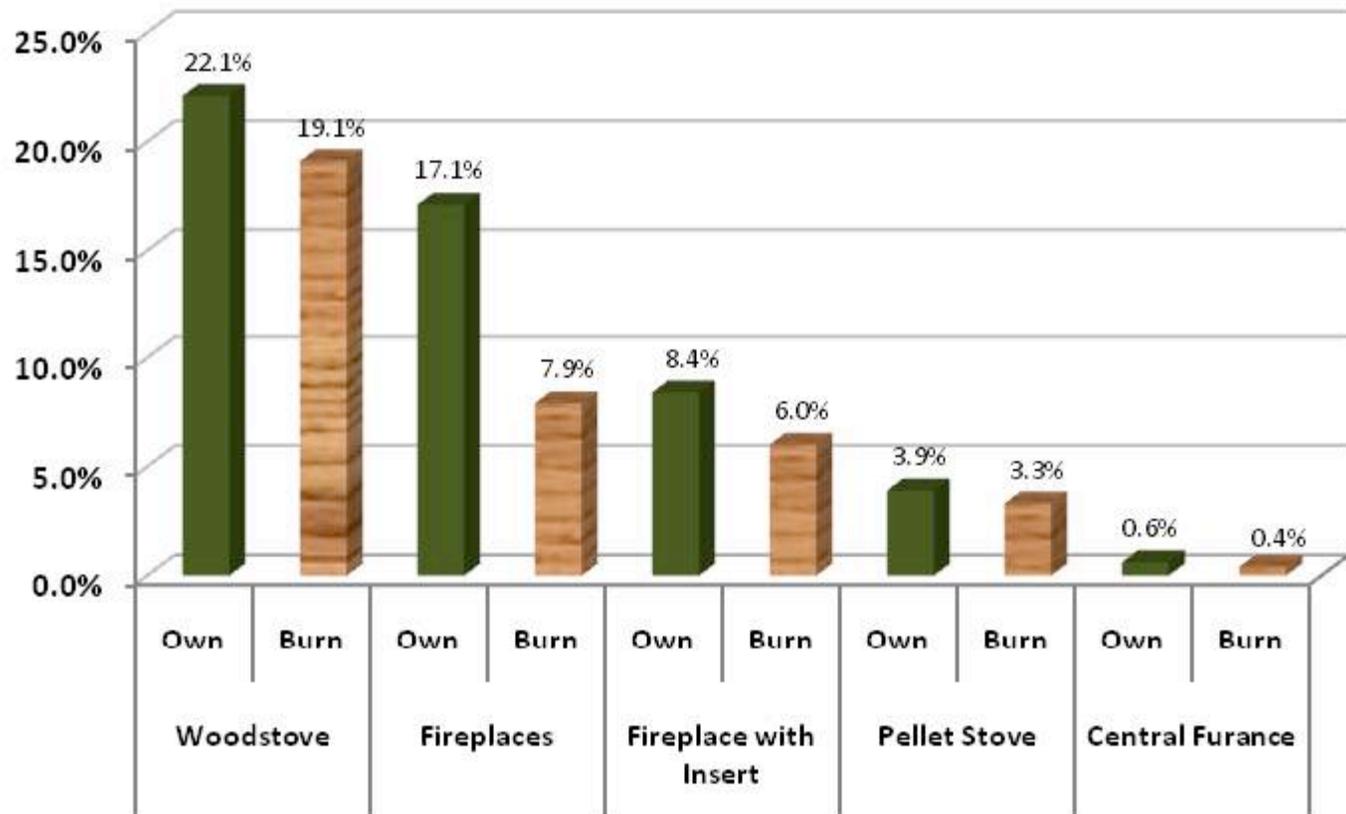


Percentage of Housing Units Using Wood as Primary Heating Fuel: Survey Results vs. US Census Data





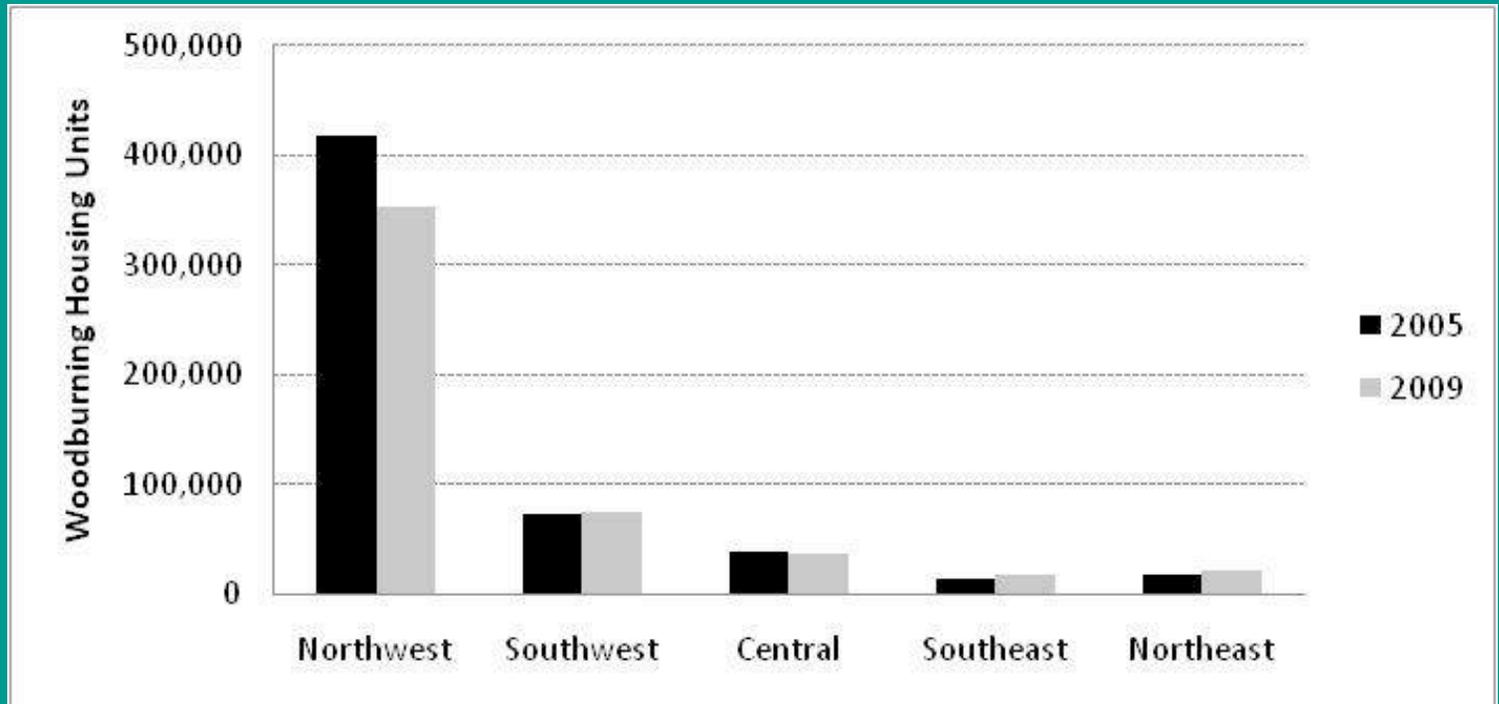
Statewide % Respondents Who Own vs. Burn, by Device



Survey Final Report, Figure 4



Total Woodburning Housing Units



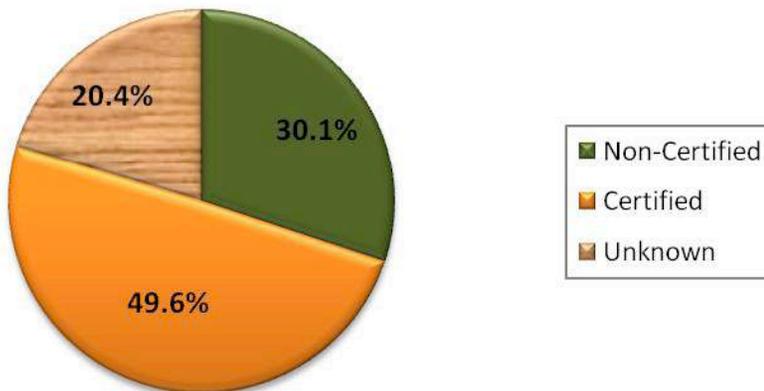
2009 Estimated Total Woodburning HU = 502,000
or approximately 30% of statewide HUs

2005 estimates based on 2000 statewide survey
2009 Source Data: Survey Final Report, Table 13

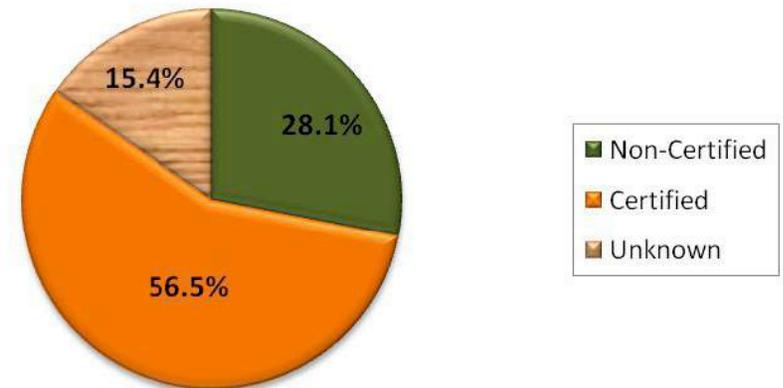


DEQ or EPA Certification

Statewide Insert Certification



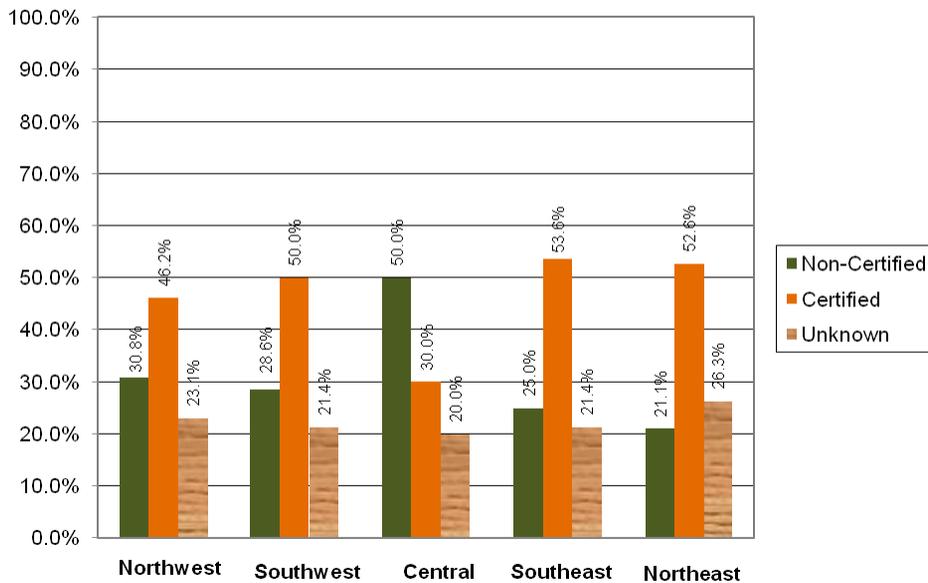
Statewide Woodstove Certification



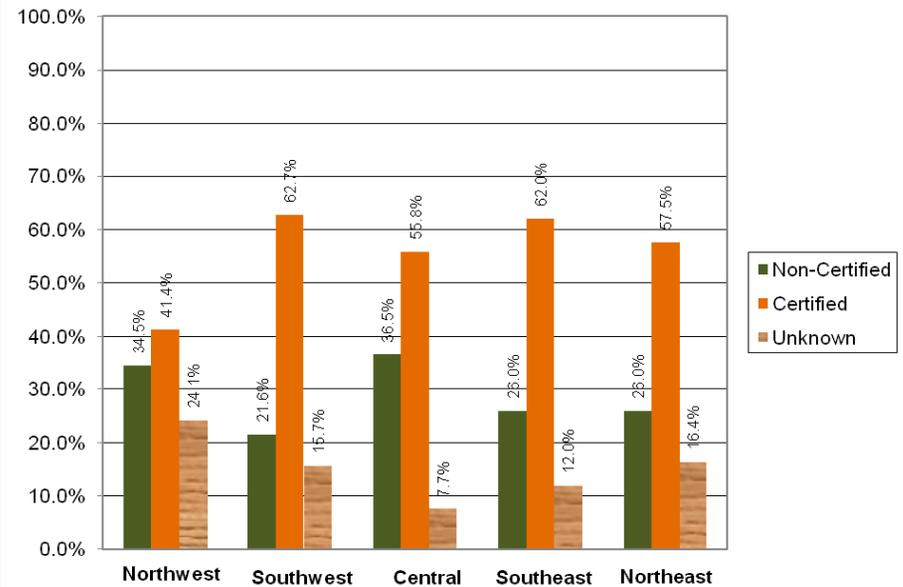


DEQ or EPA Certification

Insert Certification by Region



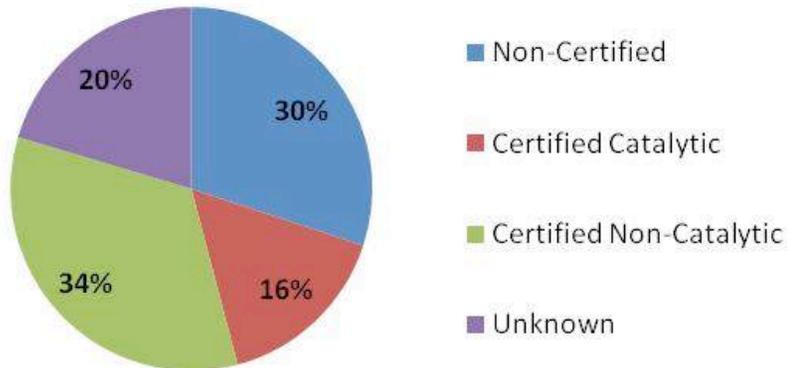
Woodstove Certification by Region



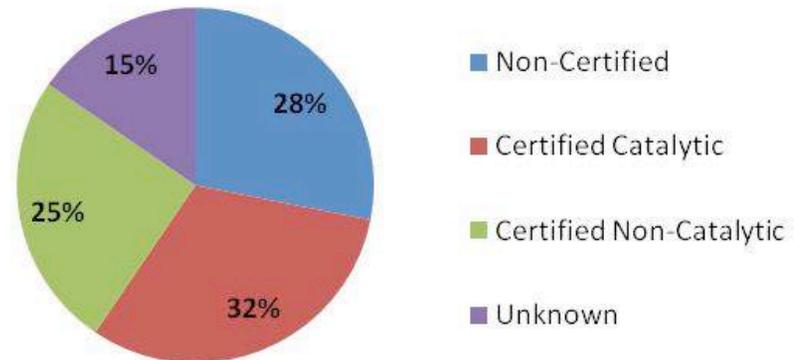


Catalytic/Non-Catalytic Breakdown

Statewide Insert by Type



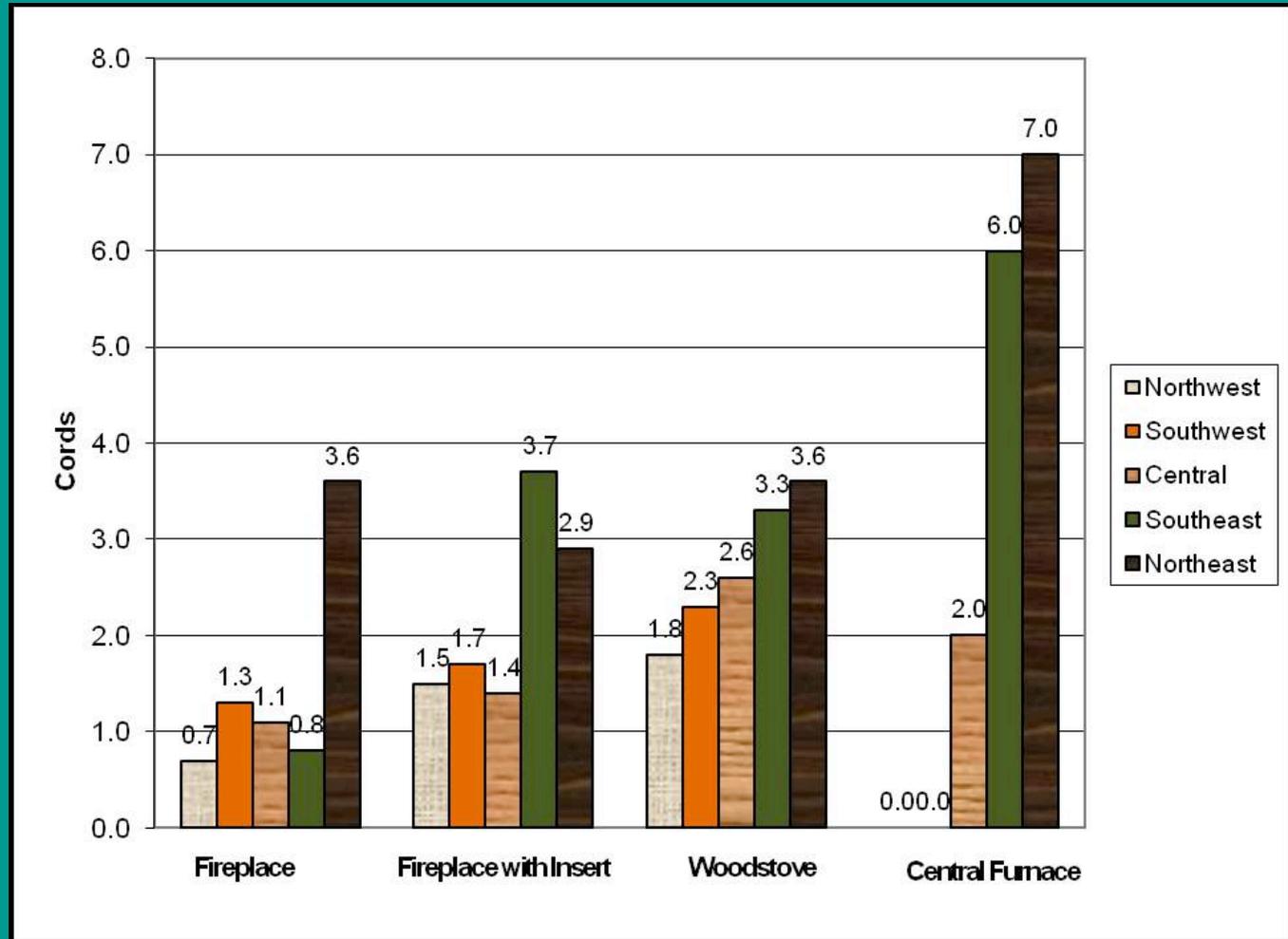
Statewide Woodstove by Type





Department of Environmental Quality

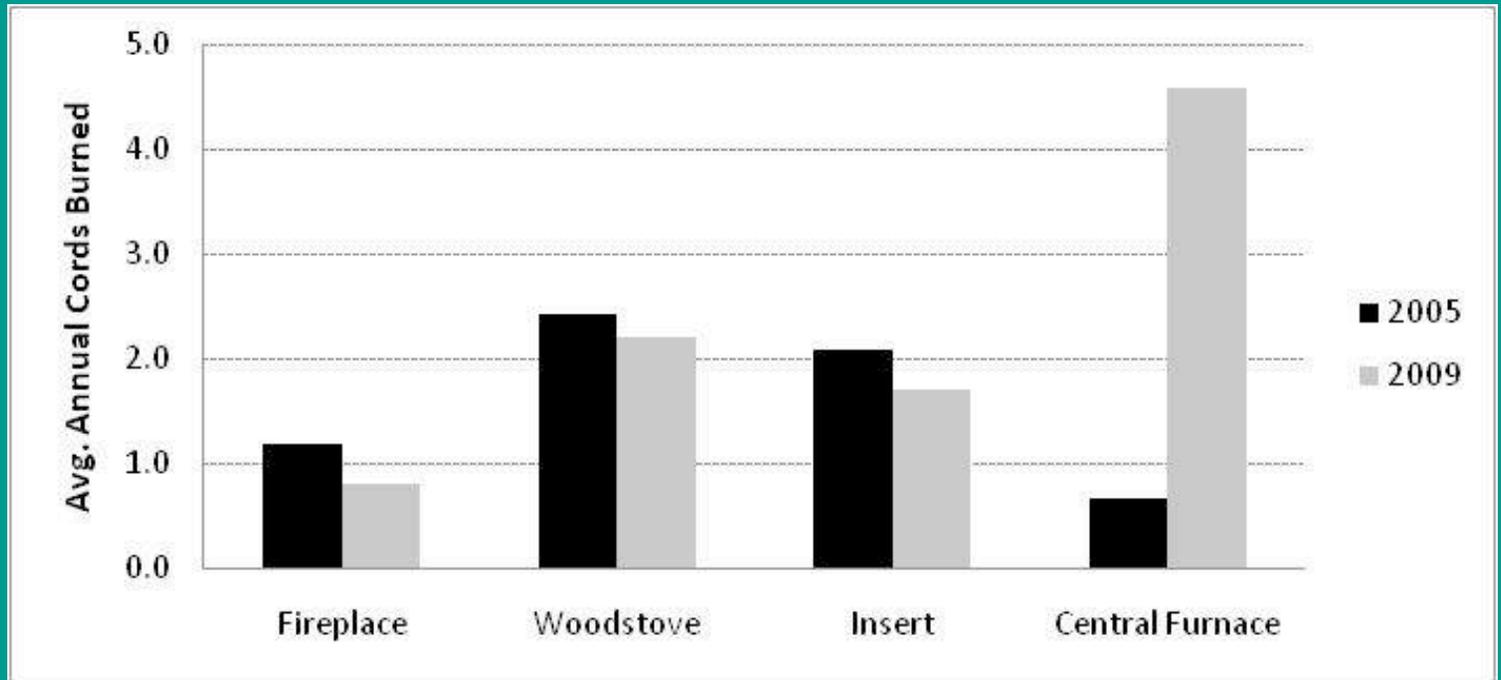
Annual Average Cords Burned By Device and Region



Survey Final Report, Figure 11



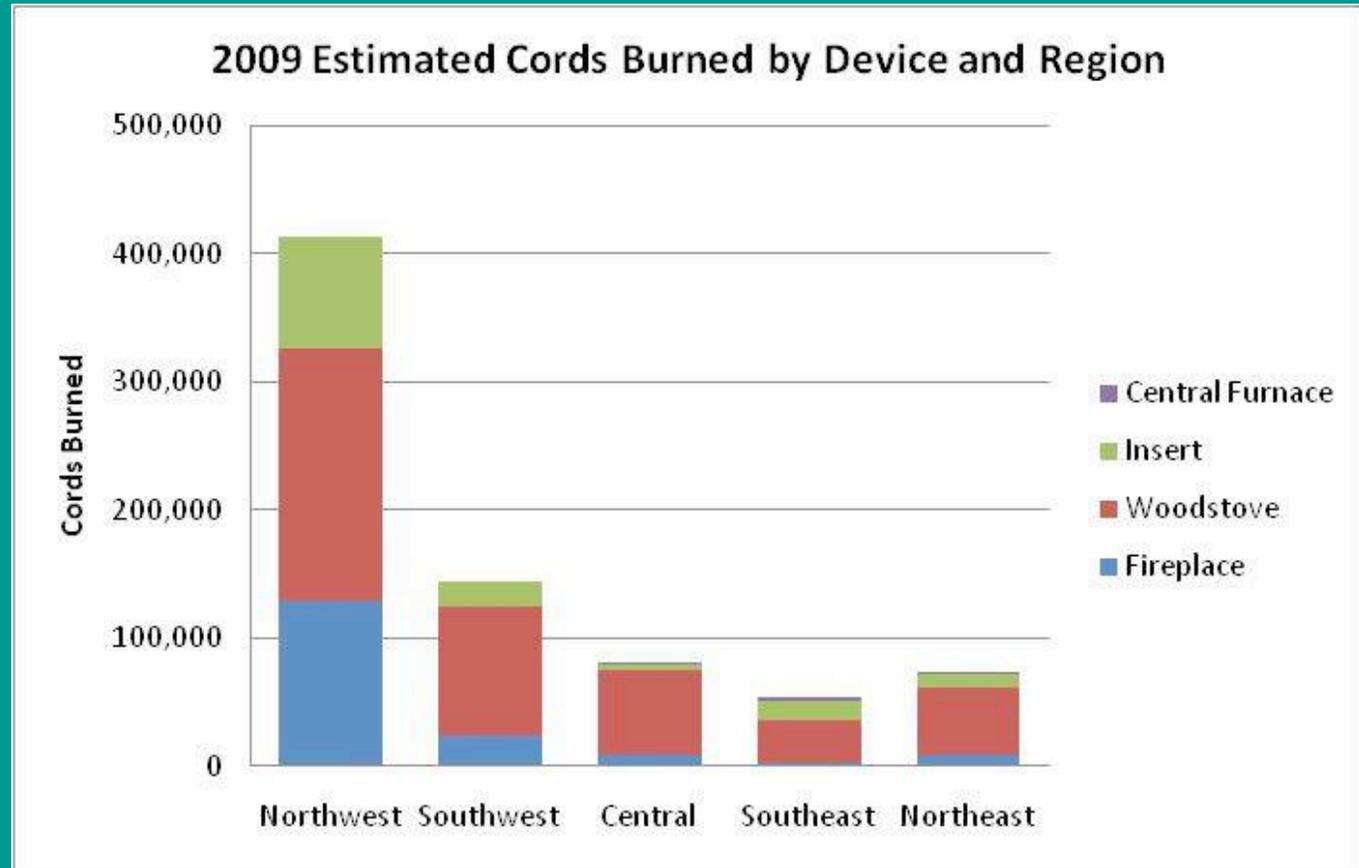
Statewide Annual Average Cords Burned By Device



2005 estimates based on 2000 statewide survey
2009 Source Data: Survey Final Report, Table 13



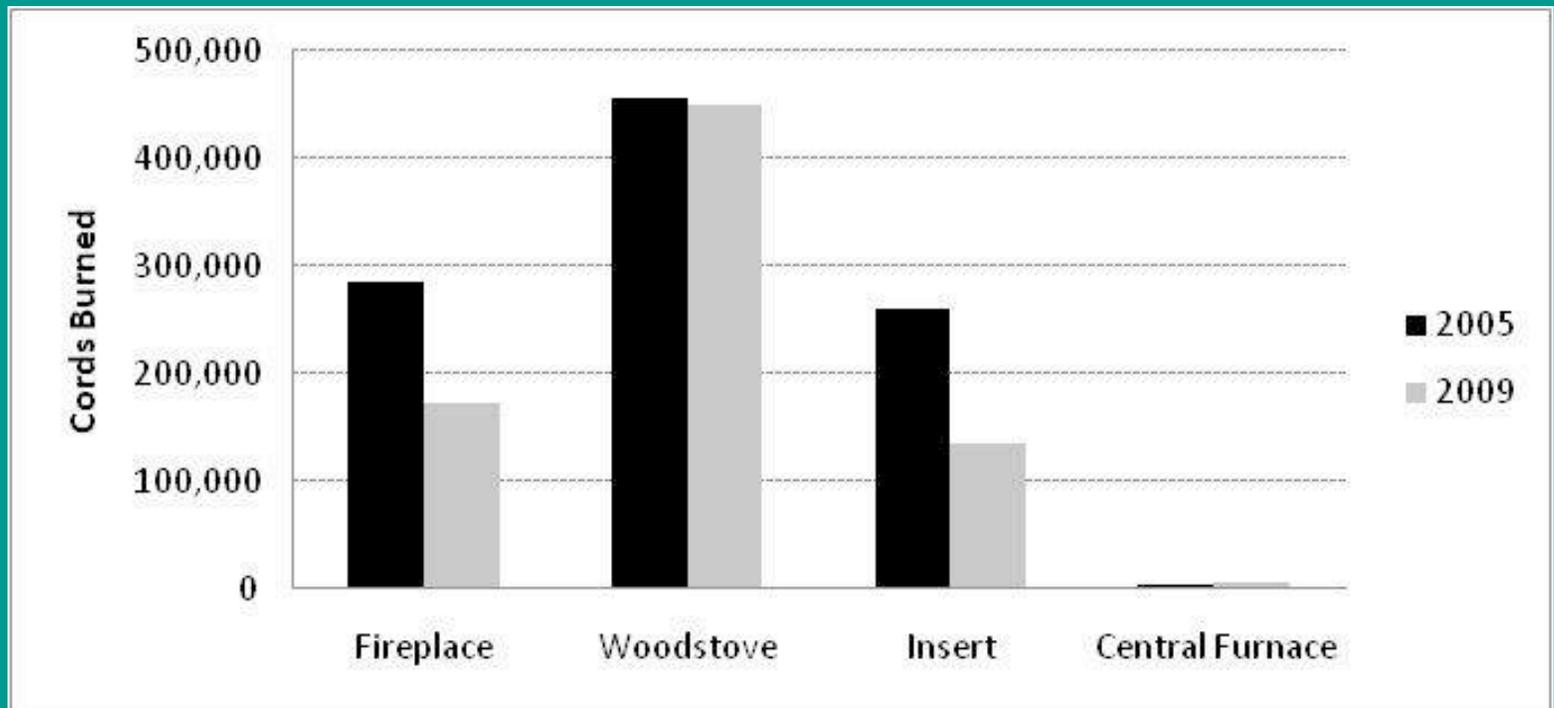
Total Cords Burned By Device and Region



Source Data: Survey Final Report, Table 13



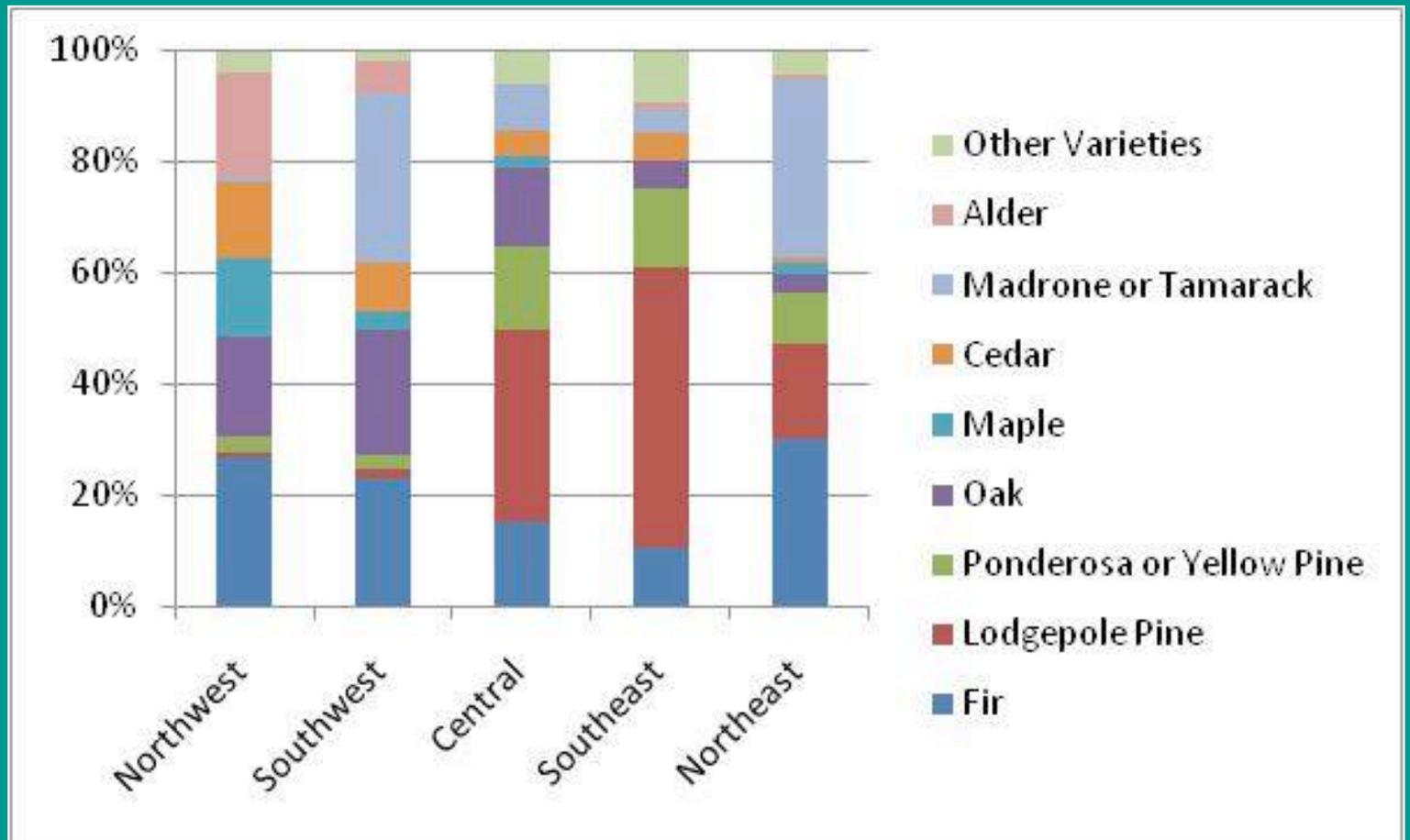
Statewide Total Cords Burned By Device



2005 estimates based on 2000 statewide survey
2009 Source Data: Survey Final Report, Table 13



Species Wood Burned by Region



Source Data: Survey Final Report, Table 15a



“Typical” Cord Weight by Region, Based on Species Content & Density*

Region	2009 (tons/cord)	2005 (tons/cord)	Decrease
Northwest	1.22	1.42	-14%
Southwest	1.31	1.66	-21%
Central	1.18	1.23	-4%
Southeast	1.11	1.16	-5%
Northeast	1.21	1.53	-21%

* Air dried wood, moisture content assumed to be 12%:
Cord volume assumed to be 80 cu ft. to account for air pockets



Mass Wood Burned

Equation (1) *Tons Wood Burned by County and Device* = $(a) / (b) * (c) * (d) * (e) * (f)$

where

a = 2008 county population: from the PSU Population Research Center

b = 2000 county population: from the PSU Population Research Center

c = 2000 county housing units (HU): from US Census Bureau data

d = % wood burning HU, by region and device: from survey results

e = average volume of wood burned in cords, by region and device: from survey results

f = typical cord density in tons per cord, by region: from survey results



Mass Pellets Burned

Equation (2) *Tons Pellets Burned by County and Device* = $(a) / (b) * (c) * (d) * (e)$

where

a = 2008 county population: from the PSU Population Research Center

b = 2000 county population: from the PSU Population Research Center

c = 2000 county housing units (HU): from US Census Bureau data

d = % wood burning HU, by region and device: from survey results

e = average mass of pellets in tons, burned by region and device: from survey results



Mass Firelogs Burned

Equation (3) *Tons Firelogs Burned by County and Device* = $(a) / (b) * (c) * (d) * (e) * (f)$

where

a = 2008 county population: from the PSU Population Research Center

b = 2000 county population: from the PSU Population Research Center

c = 2000 county housing units (HU): from US Census Bureau data

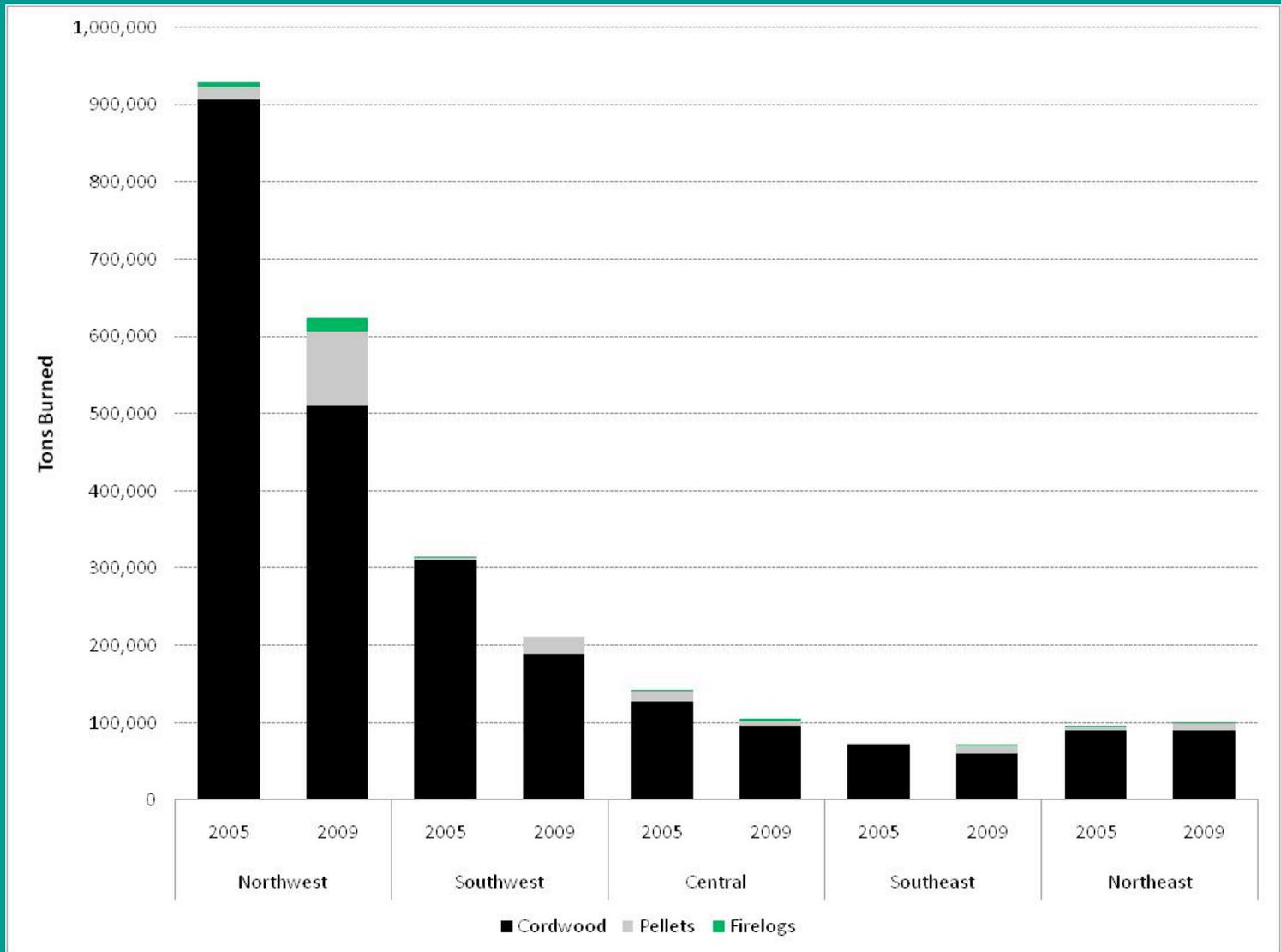
d = % wood burning HU, by region and device: from survey results

e = average number of firelogs burned by region and device: from survey results

f = firelog mass = $(8 \text{ lb/firelog}) / (2000 \text{ lbs/ton}) = 0.004 \text{ ton/firelog}$

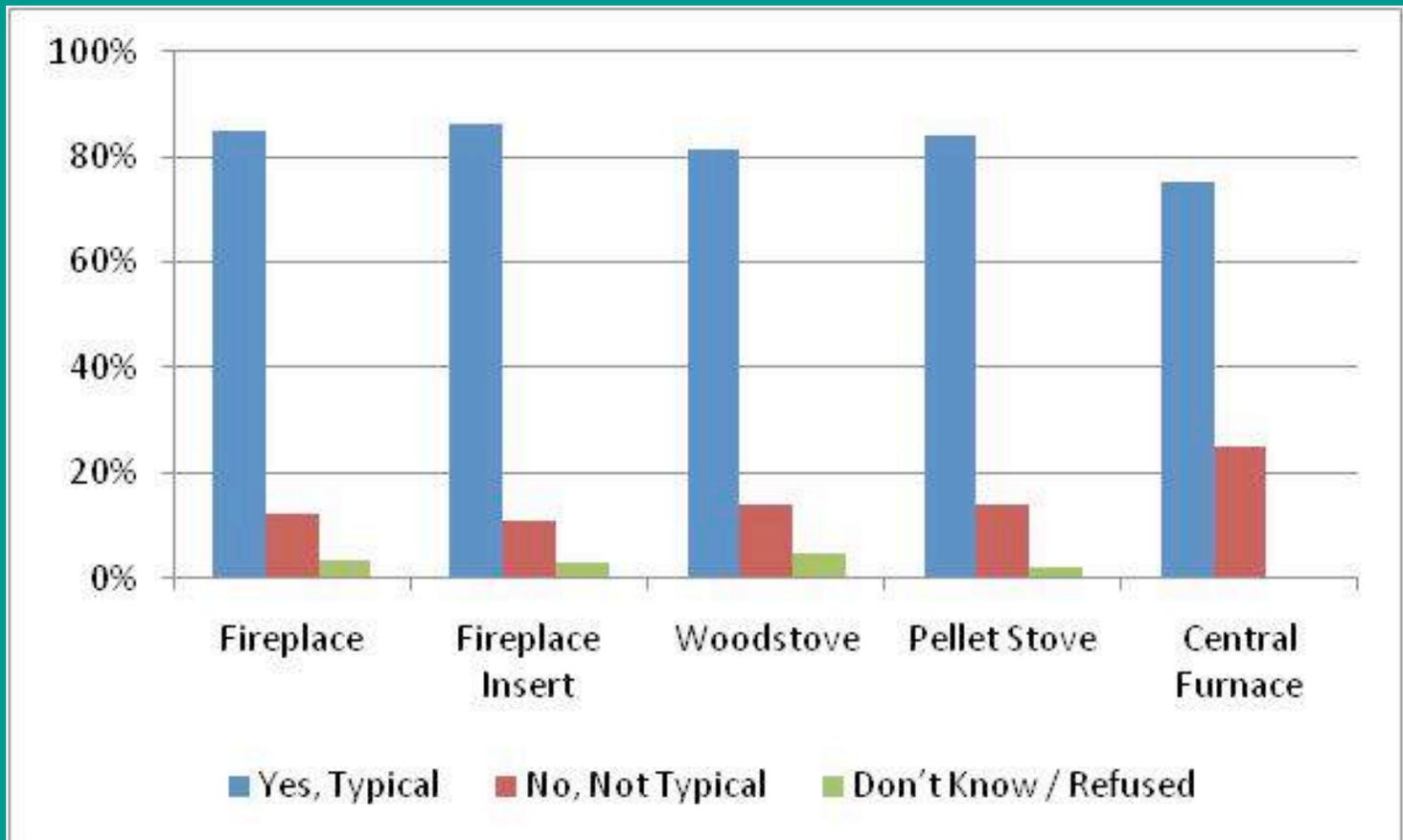


Estimated Tons Wood Fuel Burned by Region





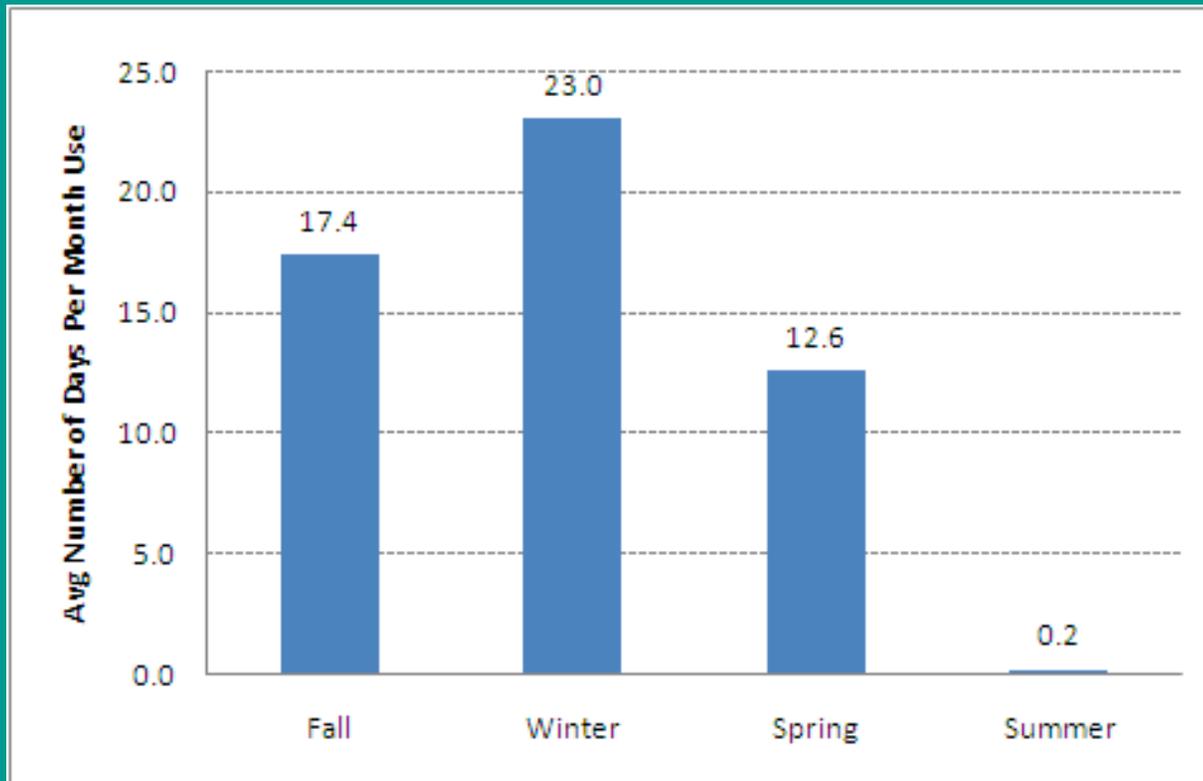
Typicality of Wood Burning



Source Data: Survey Final Report, Table 14a



Seasonal Temporal Profile



Source Data: Survey Items 16a through 16d



Department of Environmental Quality
Residential Wood Combustion Survey:
Results Report
Survey Conducted March 2009
Portland State University
Survey Research Lab
June 18, 2009

Thanks to

Amber Johnson, PhD

Tiffany Conklin, BA

Debi Elliott, PhD

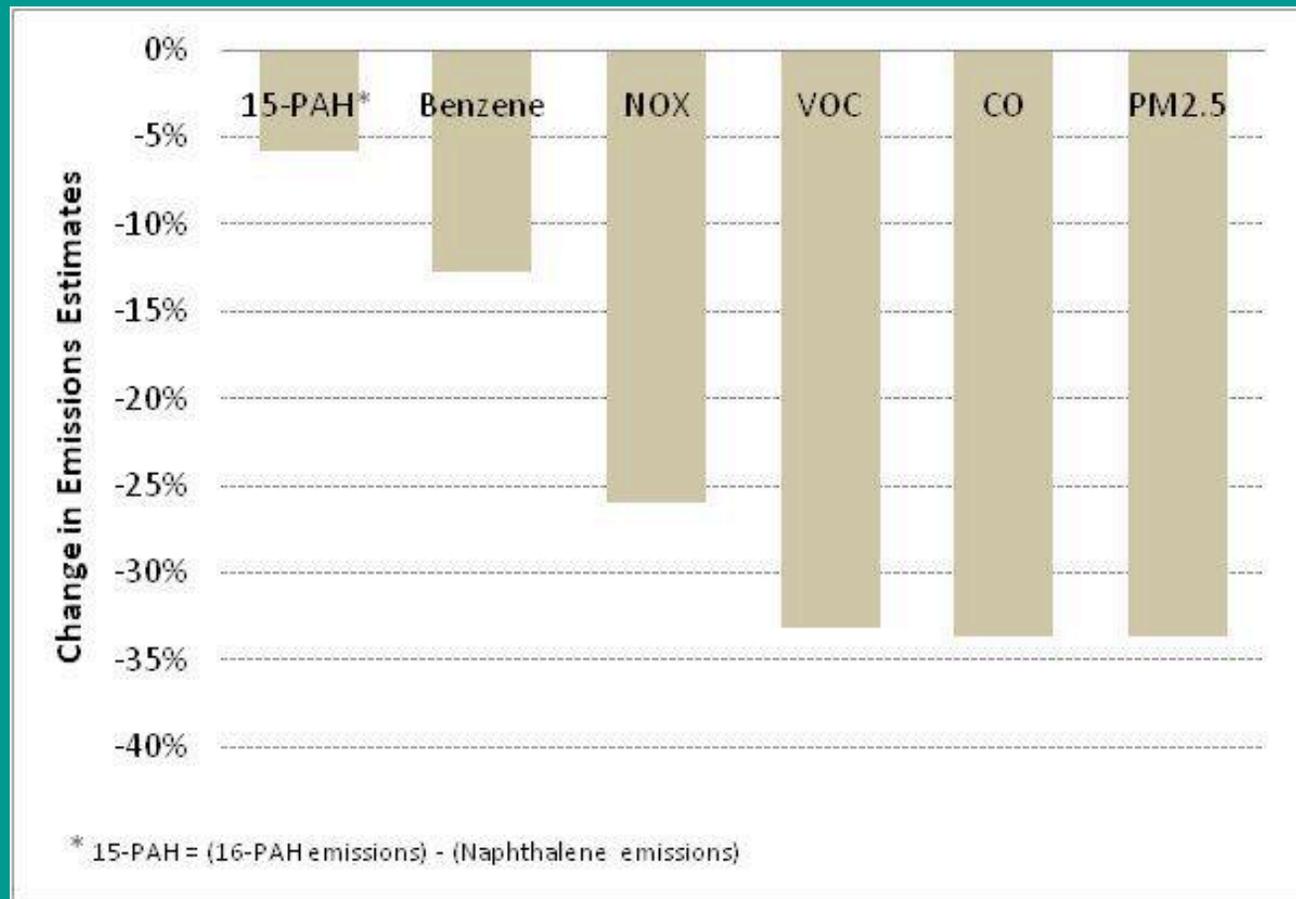
Portland State University Survey Research Lab



2009 vs. 2005: Reductions in Emissions Estimates:

Emission factors specific to device, and fuel (wood vs. firelogs)

Emission factors reviewed by the EPA NEI RWC workgroup





Questions?



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