

# Wrap-Up/Ammonia and the Clean Energy Portfolio

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Ammonia Fuel Network Conference

San Francisco – Oct 15-16, 2007

# AF IV Wrap Up

- Key Messages and Actions
  - Comparative Risk Assessment
  - Get AFN up and running
  - Good progress on
    - RE to ammonia
    - NH<sub>3</sub> in engines and fuel cells
    - Energy efficient ammonia synthesis
    - [Not] Getting decision and policymakers to support NH<sub>3</sub> Fuel
- The year in review
- Clean Energy Portfolio (aka, How NH<sub>3</sub> can help save the world, maybe.)
- What's next?

# AFN Meeting Statistics

	<b>AF I (2004)</b>	<b>AF II (2005)</b>	<b>AF III (2006)</b>	<b>AF IV (2007)</b>
<b>Where</b>	<b>Des Moines</b>	<b>Chicago</b>	<b>Denver</b>	<b>San Francisco</b>
<b>Registrants/ Attendees</b>	<b>~20</b>	<b>50</b>	<b>65</b>	<b>82</b>
<b>Organizations</b>	<b>~15</b>	<b>33</b>	<b>49</b>	<b>60</b>
<b>Presentations</b>	<b>8</b>	<b>18</b>	<b>23</b>	<b>30</b>
<b>New Orgs</b>	<b>-</b>	<b>~16</b>	<b>34</b>	<b>38</b>
<b>Federal Staff</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>Non-USA Orgs</b>	<b>0</b>	<b>-</b>	<b>2</b>	<b>9</b>

# 12 Months Significant Events

- Ammonia fuel ICE placed in CA to run irrigation pump
- Vehicle engines, SI and CI, running in labs and roads across N. America
- Rapidly growing interest in renewables to ammonia
- Progress in energy-efficient green ammonia synthesis and direct ammonia fuel cells

# Ammonia Fueled Vehicles

Rjukan 1933



Ann Arbor 2007

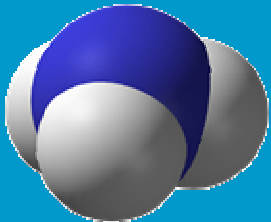


# Last Year's Action Items

- Continue Meeting on Regular Basis (check)
- Formalize Ammonia Fuel Network
- Try to get ammonia listed as an official U.S. DOE alternative fuel

# AFN Non-profit

- AFN now a formal non-profit in WA state
- Now need (volunteers?)
  - Board directors
  - By-laws
  - Structure (incl dues)
  - Mission
  - Function
  - Web Page



Promoting the Transition to Ammonia in the Energy Field

# Ammonia Fuel Network

Managed by TBD



- [Home](#)
- [Media/Press](#)
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- [General Info](#)
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Home > Ammonia Policy > **State and Regional Initiatives**

## Ammonia Headlines

- ~~~~~
- ~~~~~
- ~~~~~

[Ammonia Policy](#)

## State and Regional Initiatives

[The Energy Bill](#)

Below you'll find ammonia fuel initiatives, list alphabetically and by state

[Testimony](#)

[Policy Publications](#)

[State and Regional Initiatives](#)

[Key Ammonia Fuel Messages](#)

[Policy Contacts](#)

Search this site



Organization	State
California Ammonia Fuel Cell Partnership	CA
California Ammonia Business Council	CA
California Stationary Fuel Cell Collaborative	CA
Connecticut Ammonia Fuel Cell Coalition	CT
East Tennessee Ammonia Initiative	TN

**Ammonia Technologies Permitting Workshop**  
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**Ammonia Fuel Uses in the Military**  
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**Ammonia Student Design Contest NH3**  
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# NH<sub>3</sub> an Alternative Fuel?

<http://www.eere.energy.gov/afdc/fuels/index.html>

## Alternative Fuels

These fuels are defined as alternative fuels by the Energy Policy Act of 1992 and are currently, or have been, commercially available for vehicles.

- Biodiesel
- Electricity
- Ethanol
- Hydrogen
- Methanol
- Natural Gas
- Propane

# NH<sub>3</sub> an “Emerging Fuel”?

## Other Emerging Fuels

Several emerging fuels are currently under development. Many of these fuels are also considered alternative fuels and may have other benefits such as reduced emissions or increased energy security.

- Biobutanol
- Biogas
- Biomass to Liquids (BTL)
- Coal to Liquids (CTL)
- Fischer-Tropsch Diesel
- Gas to Liquids (GTL)
- Hydrogenation-Derived Renewable Diesel (HDRD)
- P-Series
- Ultra-Low Sulfur Diesel

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# The (Clean) Energy Portfolio

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# Going Down?

- Energy Supply
- Energy Independence
- Energy Security
- Energy Economy (Prices)
  
- Energy Demand

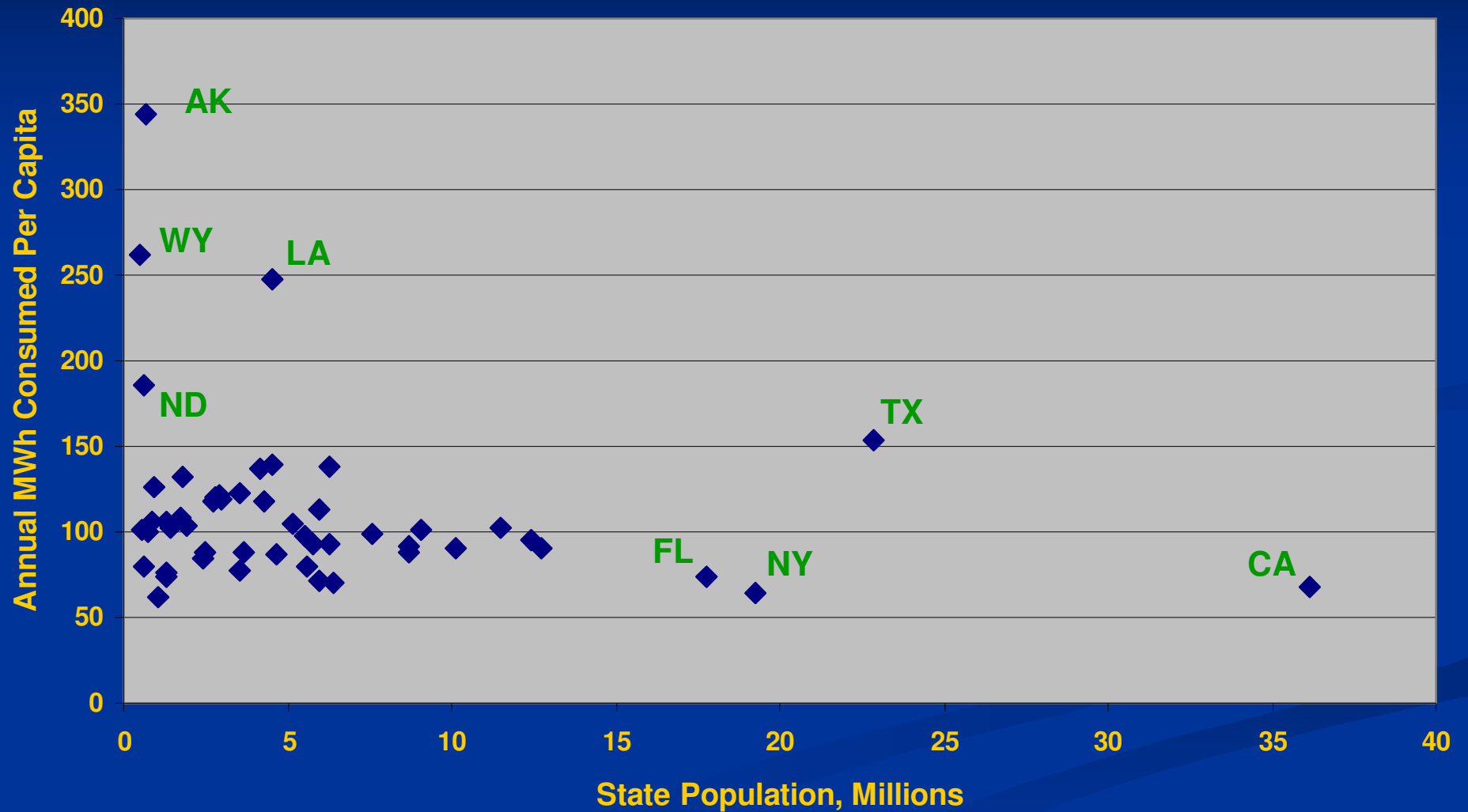
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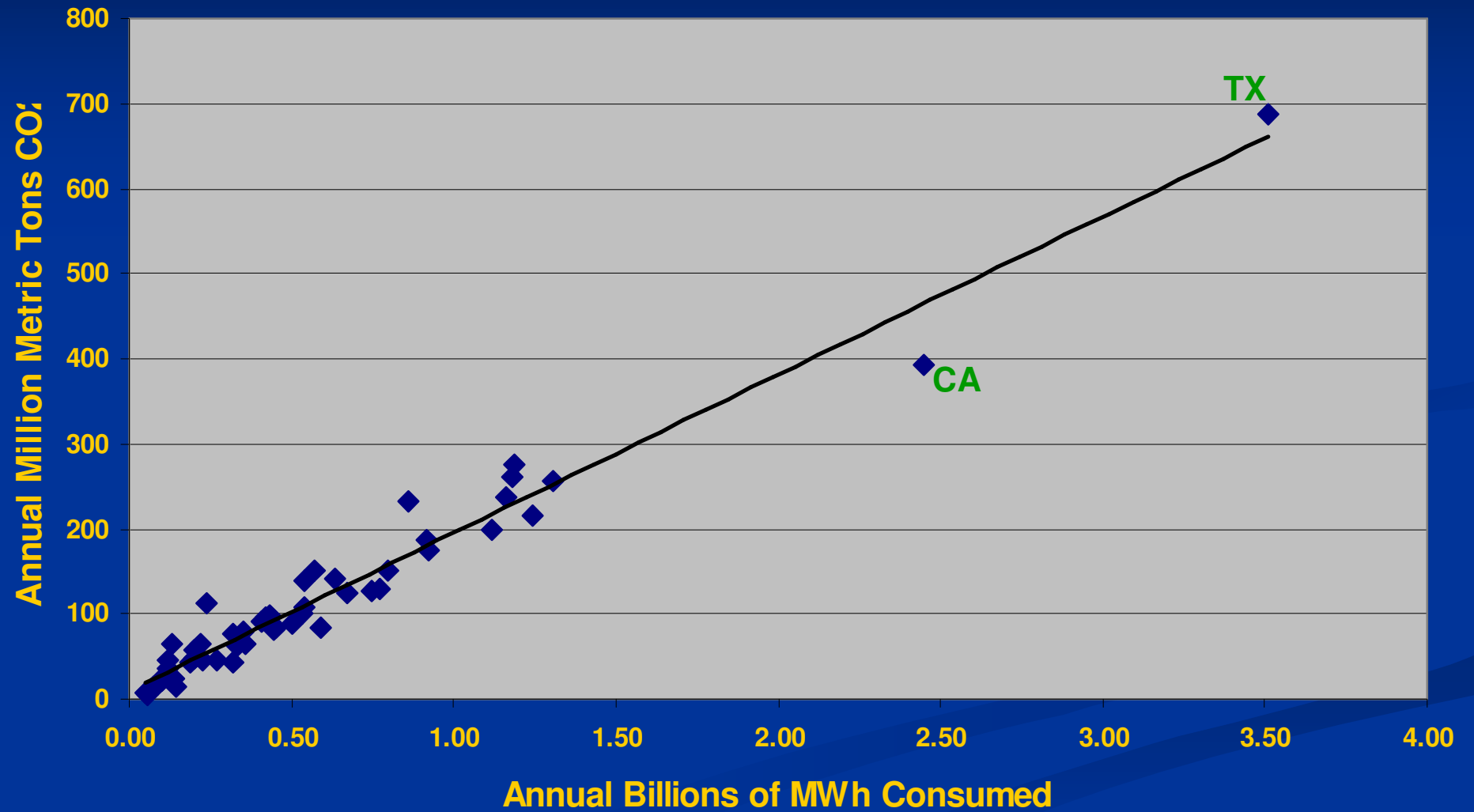
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# U.S. Per Capita Energy Use by State

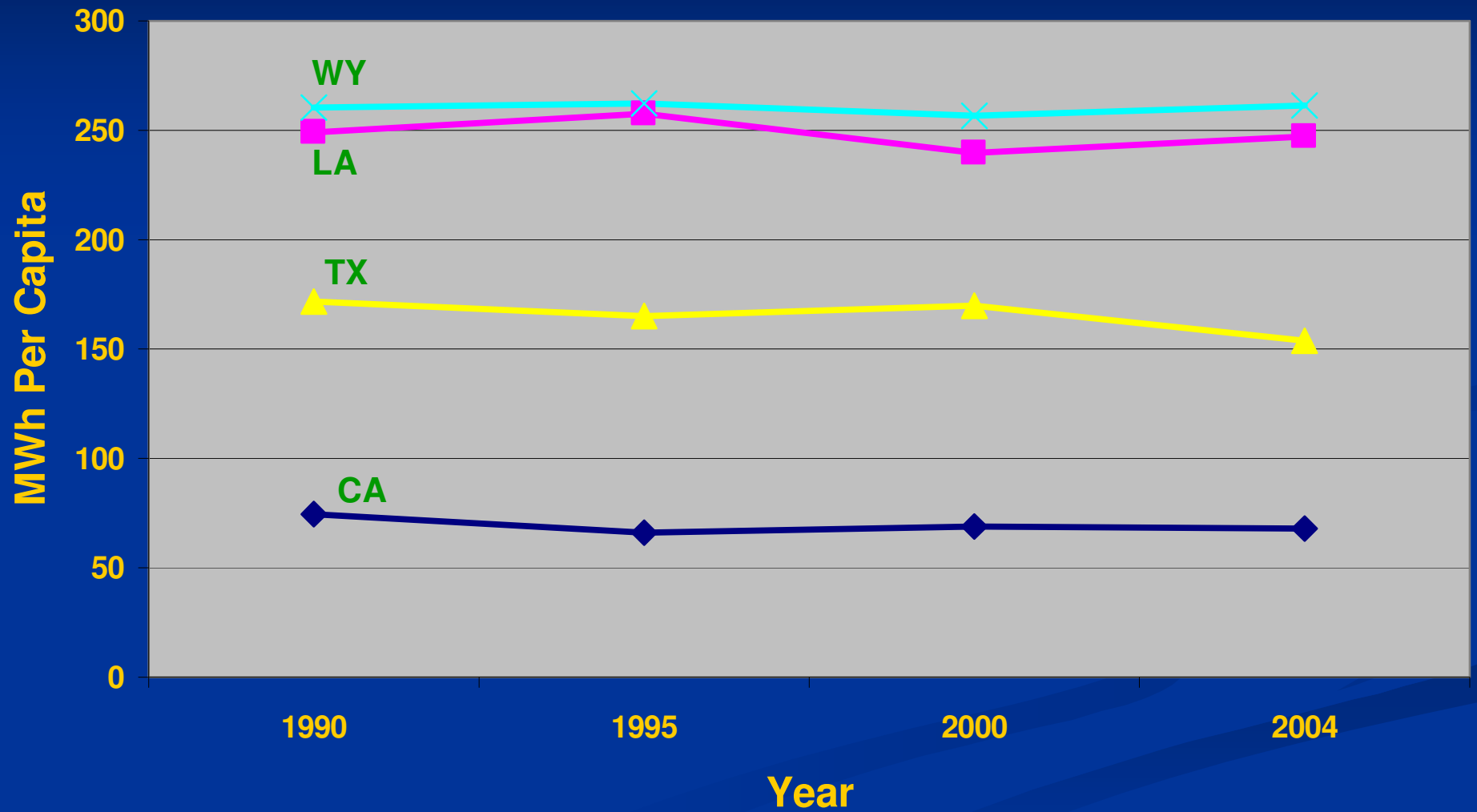


# CO2 Emissions By State

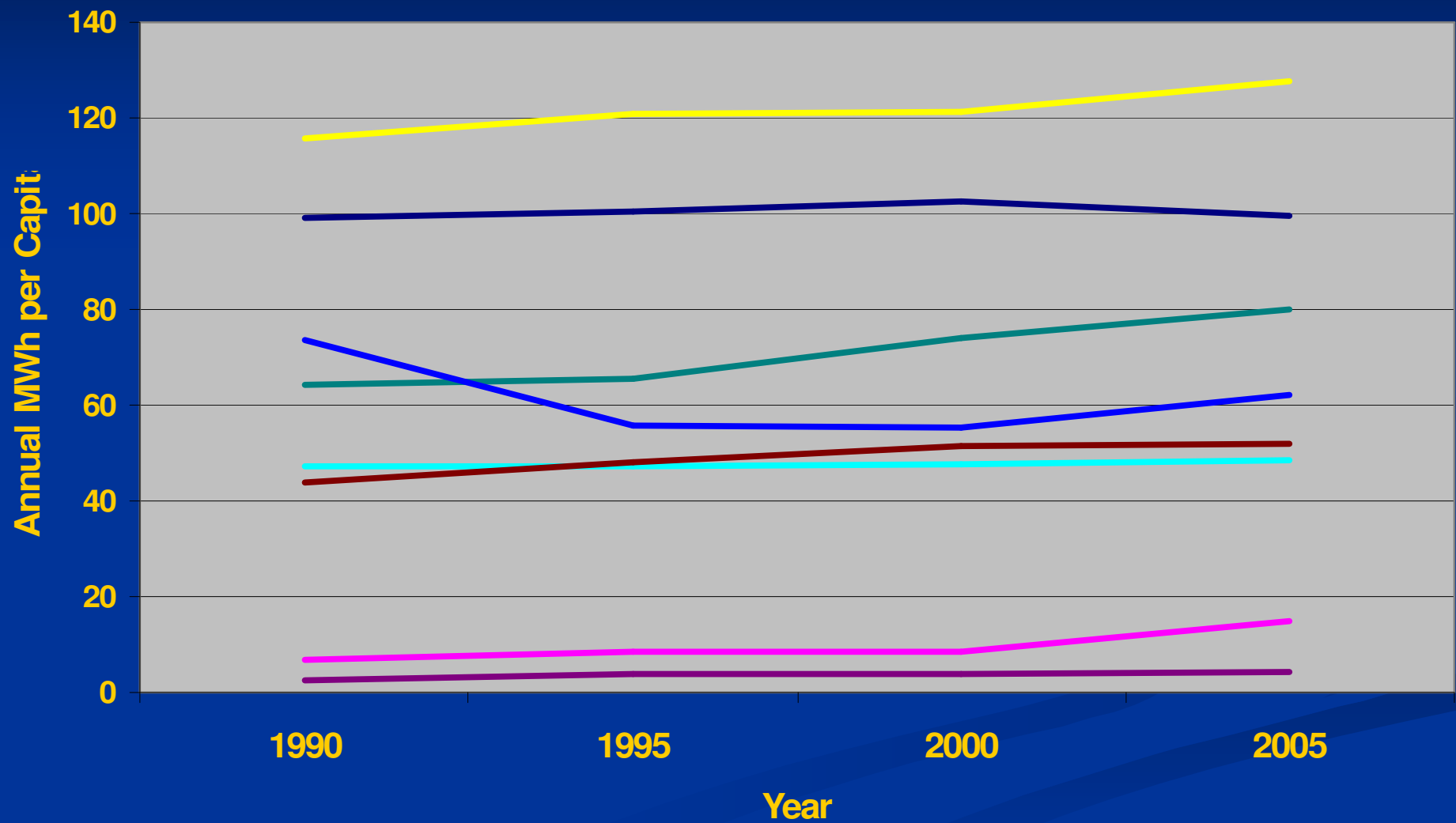




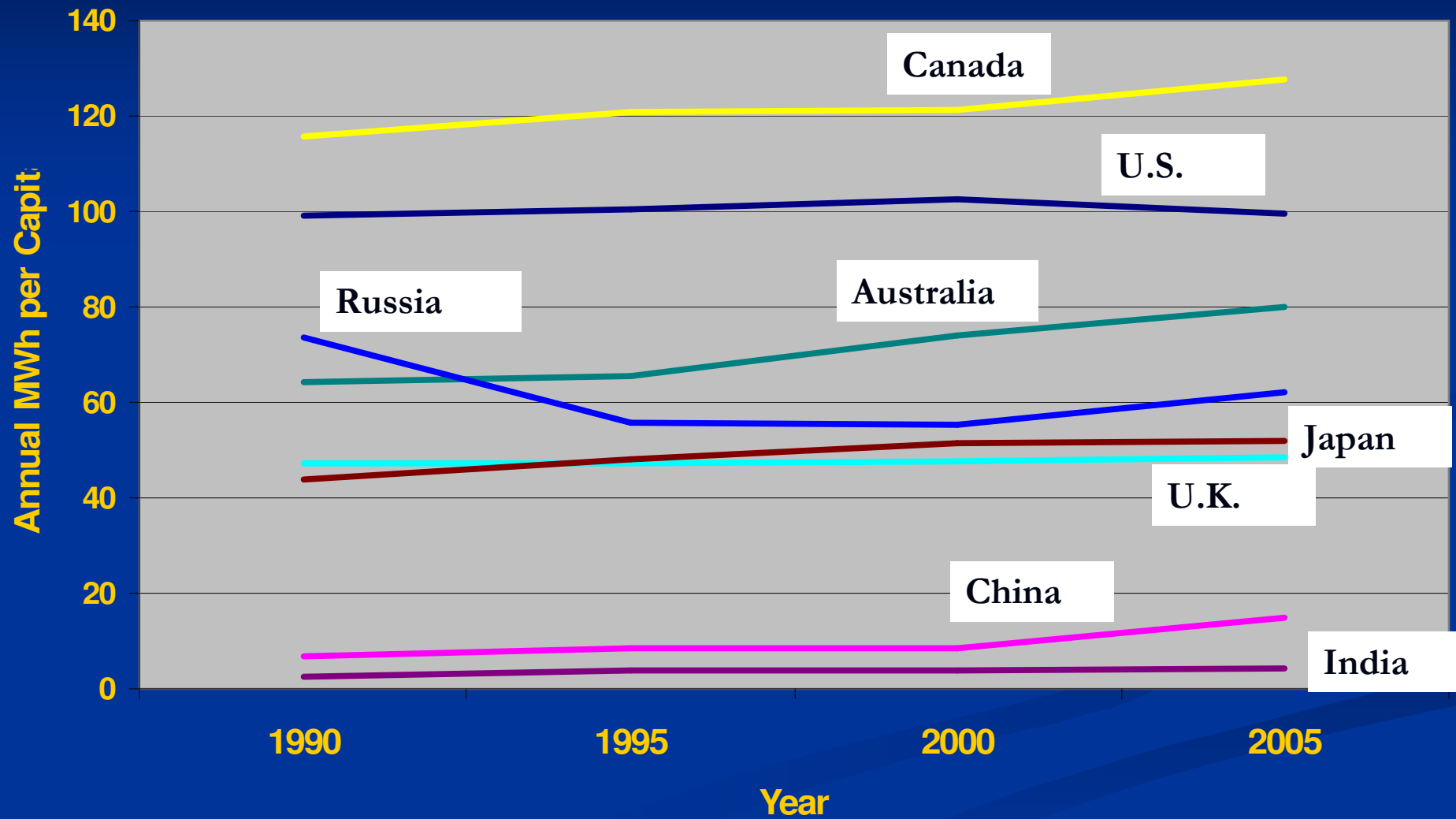
# Annual Per Capita MWh Consumed



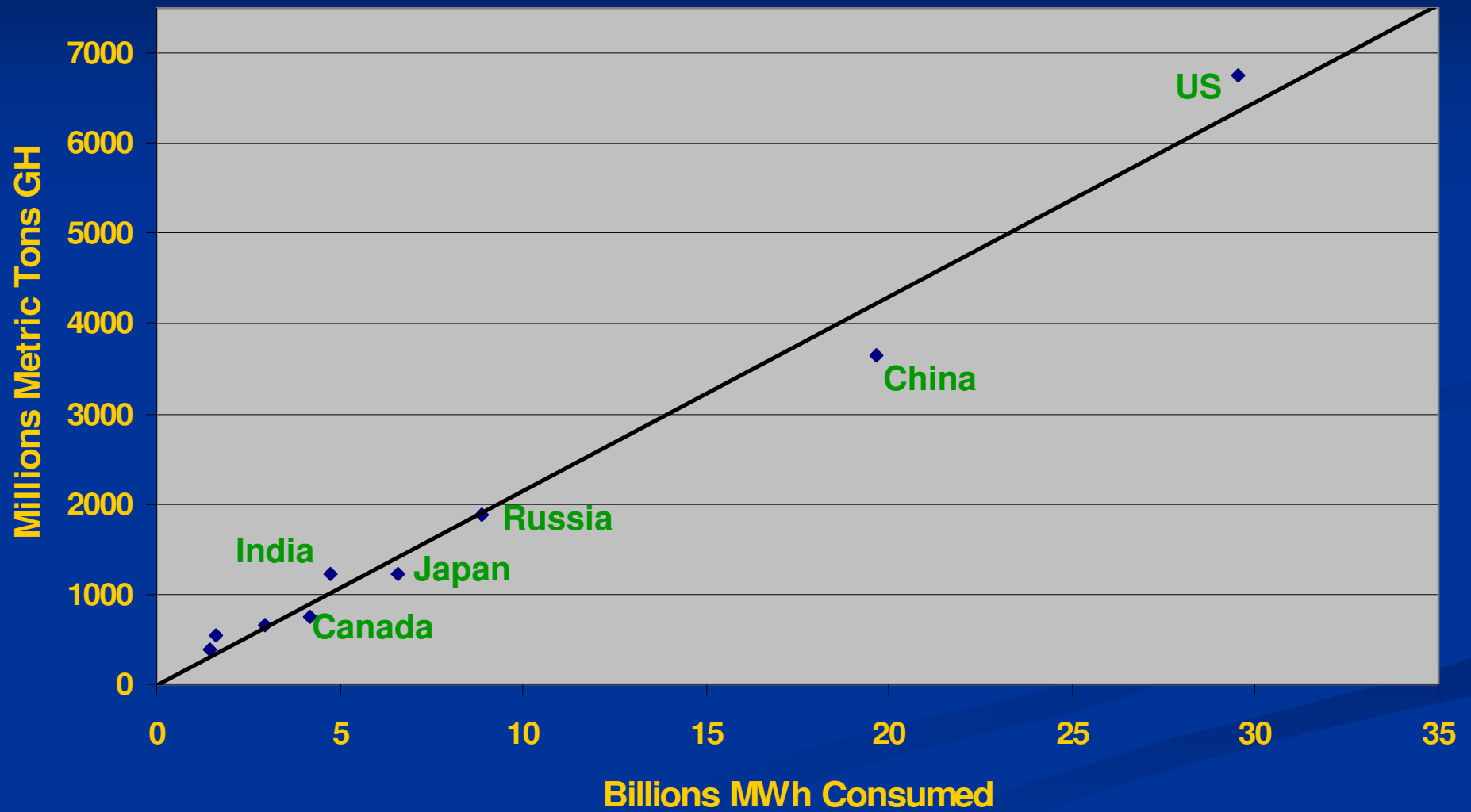
# Per Capita Energy Use by Country



# Per Capita Energy Use by Country



# World GHG Emissions Per Energy Use



# This Year's Questions

- Published proceedings next year
- How to get policymakers involved
- Other?

# Next Year in Minn

- Somewhere between Minneapolis and Morris
- Avg October temperature  $>$  Zero F

**Thanks !**