



# U.S. DEPARTMENT OF ENERGY

## Mid-Columbia Region Clean Energy Opportunities



**EM** *Environmental Management*

safety ♦ performance ♦ cleanup ♦ closure

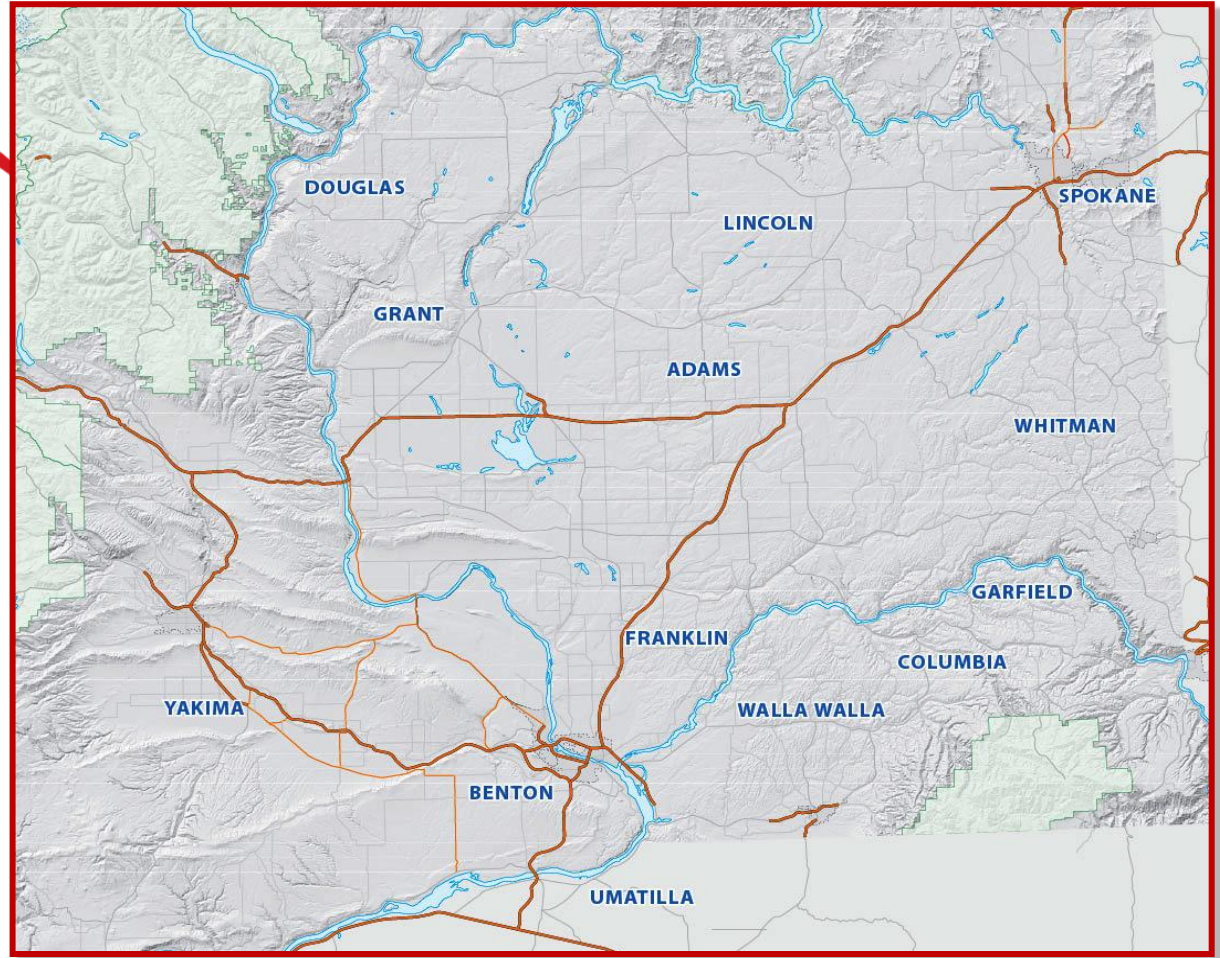
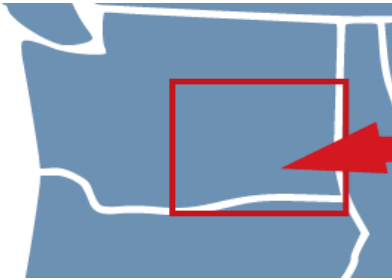
[www.em.doe.gov](http://www.em.doe.gov)

# Clean Energy in the Mid-Columbia Region

- The Mid-Columbia region of southeast Washington offers outstanding opportunities for creation of an industrial base for clean energy and other developments



# The Mid-Columbia Region of Southeast Washington



- Plateau terrain
  - Steppe
- Rich in agriculture
  - Wheat, corn, grapes, alfalfa
- Rivers run through it
  - Columbia, Snake, Yakima
- Rich heritage
  - Cultural
  - Historic
  - Geologic



**EM** *Environmental Management*

safety ♦ performance ♦ cleanup ♦ closure

[www.em.doe.gov](http://www.em.doe.gov)

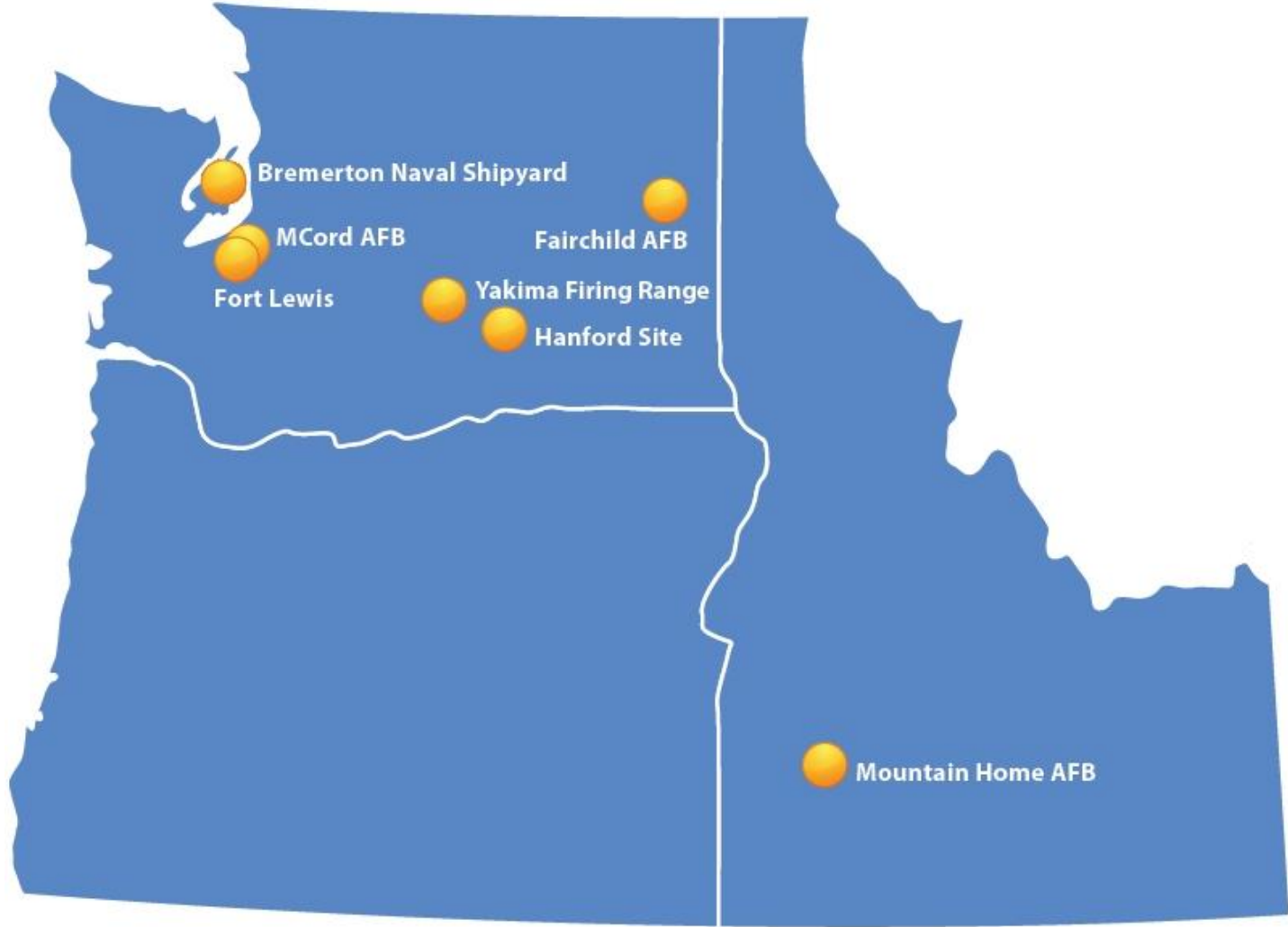
# Clean Energy:

## *Scoping some potential markets*

- National needs – fuel consumption
  - Forecast fuel use increased 3.1 million barrels per day by 2035
- Pacific Northwest region - electricity use
  - Forecast 7,000 MW increase in electricity use through 2030
- U.S. Department of Defense regional consumers
  - 3 Air Force Bases, 2 major Army facilities, and 1 Naval shipyard in the Pacific Northwest Region
  - Columbia River provides access from inland areas to West Coast and Pacific commands
- U.S. Department of Energy – Hanford Site
  - Forecast 60 MW increase in consumption by 2020
  - Required reductions in petroleum use and greenhouse gas production



# DOD and DOE Facilities in the Pacific Northwest



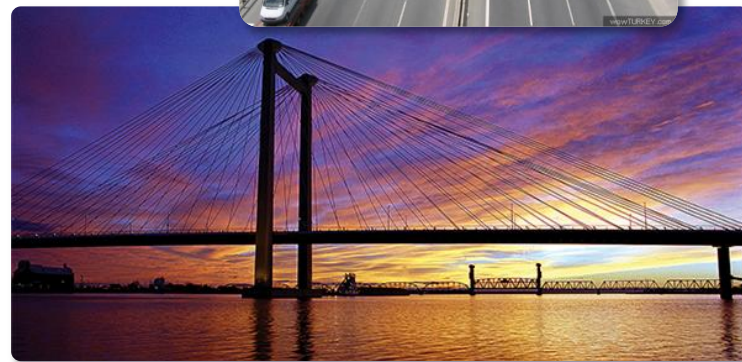
**EM Environmental Management**

safety ♦ performance ♦ cleanup ♦ closure

[www.em.doe.gov](http://www.em.doe.gov)

# Regional Attributes

- Low cost of doing business
- Roads, Rails & Rivers
  - Diverse transportation infrastructure built up around DOE/DOD and agricultural needs
- Capable & highly educated workforce
- Available reserved water rights and clean, low cost electricity
- Robust community support



**EM** *Environmental Management*

safety ♦ performance ♦ cleanup ♦ closure

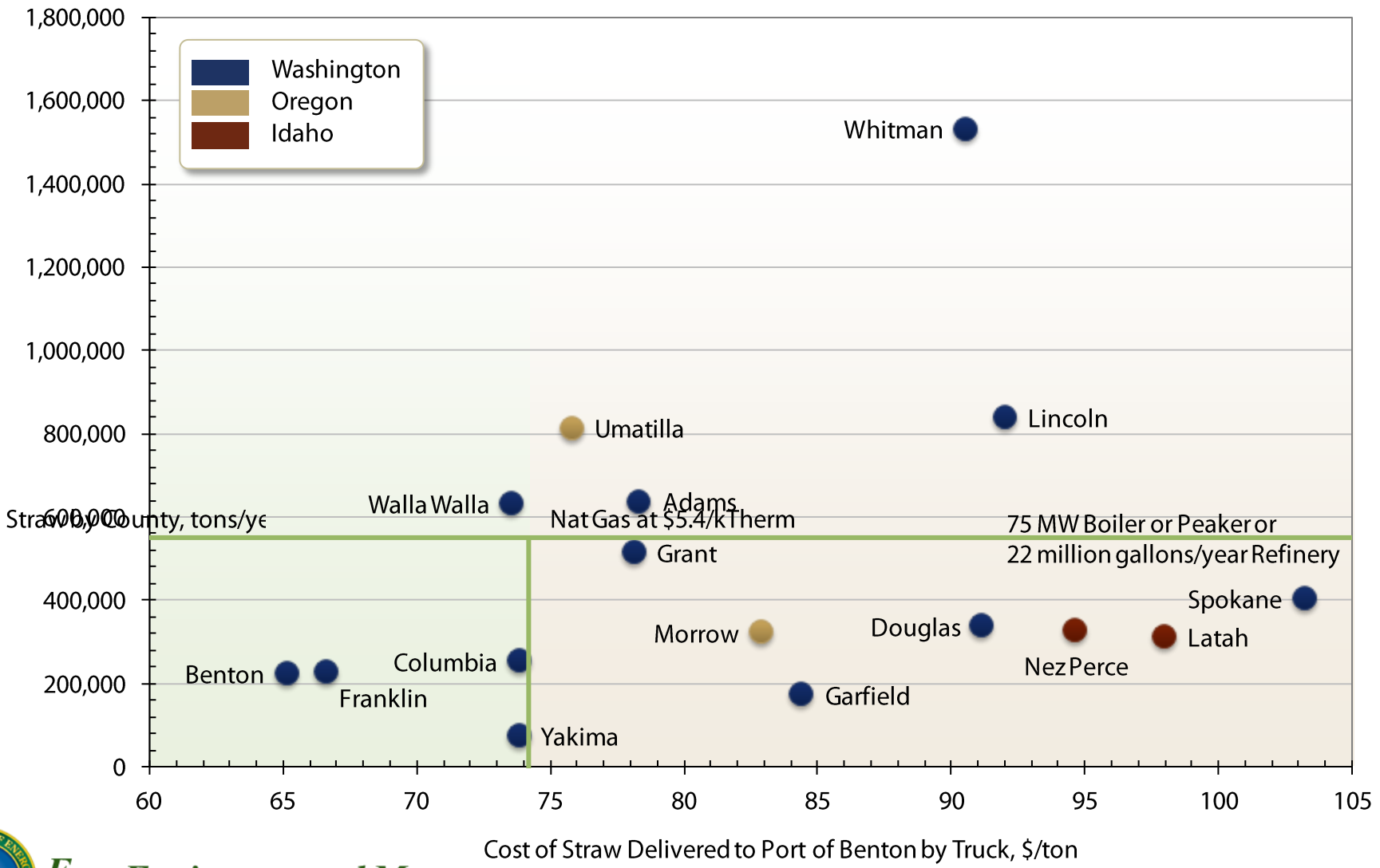
[www.em.doe.gov](http://www.em.doe.gov)

# Mid-Columbia Region rich in agricultural waste resources

- Region within 150 road miles of Richland, Washington on the Columbia River grew 7.5 million tons of wheat straw in 2007
  - Enough to manufacture >300 million gallons of liquid fuel annually, or ~1,000 megawatts of electricity continuously
- Other crops produce usable smaller amounts
  - Alfalfa, grapes, corn
- Pacific Northwest economics conversion to liquid fuels and chemicals over electricity
  - Varies with market conditions, time of year, etc.



# Biomass Availability and Cost Delivery by truck



**EM Environmental Management**

safety ♦ performance ♦ cleanup ♦ closure

[www.em.doe.gov](http://www.em.doe.gov)



# Feedstock Logistics

- Transportation of large amounts (>1M tons/yr of biomass) to processing points will provide economic advantage for large developments through economies of scale
  - Feedstock logistics costs can represent up to one-third of the final end product cost, so minimizing cost throughout the supply chain is crucial.
- The DOE Biomass Program has invested \$21.3M in feedstock logistics demonstration projects to focus on commercial equipment availability
- Commercial development of lightweight, multi-modal rail cars enables reduced cost for movement of large amounts of biomass
- *The end result will be reduced delivered feedstock costs to bring the biomass industry into cost-competitiveness with conventional fuel production*

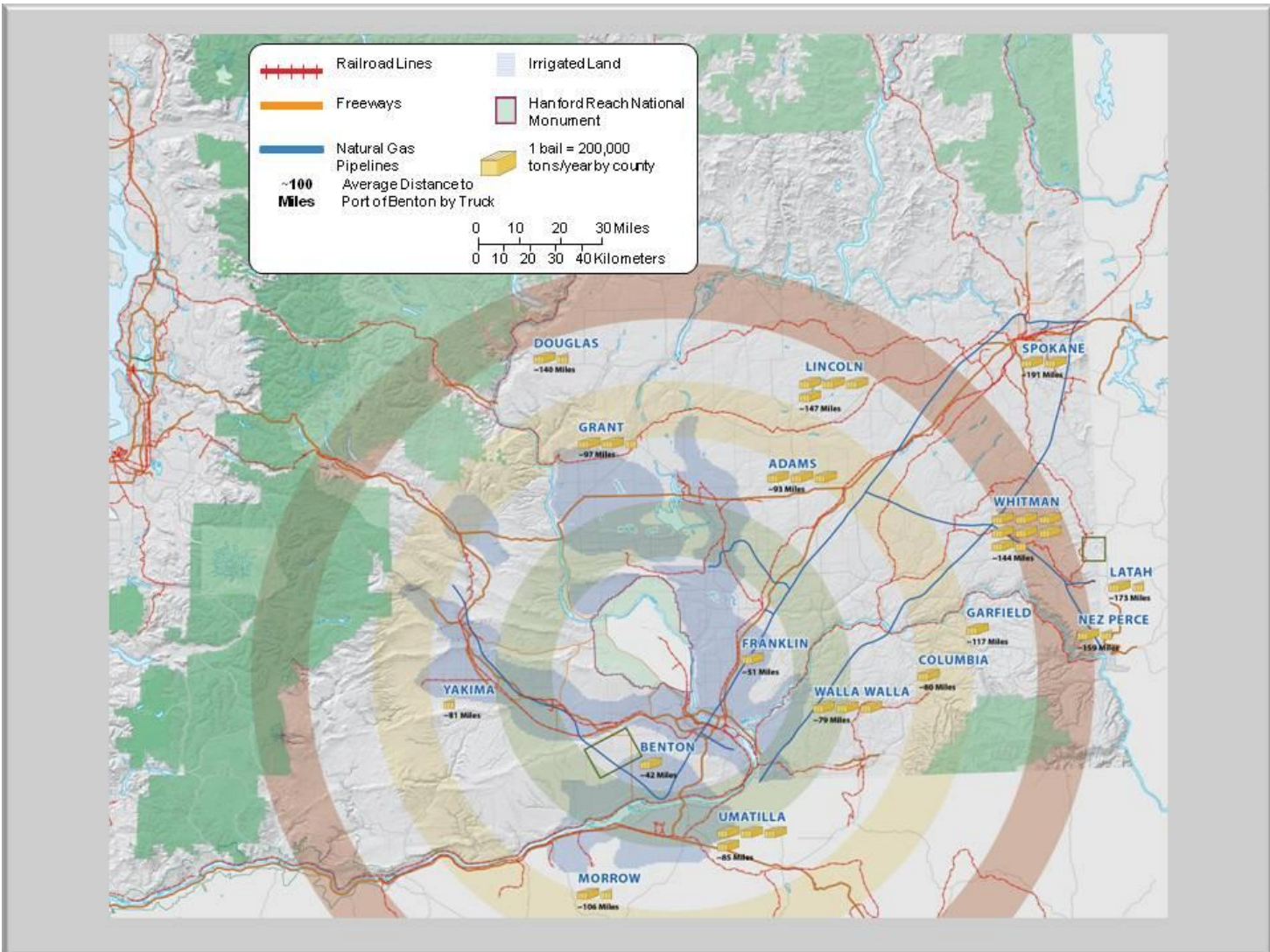


**EM** Environmental Management

safety ♦ performance ♦ cleanup ♦ closure

[www.em.doe.gov](http://www.em.doe.gov)

# Resource and Infrastructure Map



**EM Environmental Management**

safety ♦ performance ♦ cleanup ♦ closure

[www.em.doe.gov](http://www.em.doe.gov)

# Solar Findings

- Large-scale concentrating solar generation in this region is a difficult commercial proposition
  - Concentrated Solar power not expected to be economically viable
    - Low Solar Factor
    - High costs vs. photovoltaic technology
- *Photovoltaic solar deployment mature, modular and potentially cost effective*
  - *Costs have fallen sharply in past 2-3 years*
  - *Sites and interconnections to support photovoltaic deployment readily available*
    - *Commercial and government*



# Wind Findings

- Wind energy generation already widely deployed in the region
  - Most commercially developed renewable resource in the region
  - Springtime production was recently curtailed due to restrictions on grid integration with hydro
  - Wind resources in the immediate Tri-Cities area are limited
- *Ancillary Services required to integrate existing and planned wind power to the grid may provide an opportunity to deploy energy storage and clean generation technologies*



# Conclusion: The Promise of the Mid-Columbia Region

- The Mid-Columbia region has a combination of attributes needed to become a leader in clean energy technology and industry
  - Resources
  - Infrastructure
  - Supportive Community
- *A positive and supportive community environment exists in the region to help create new clean industries in the Mid-Columbia region*



**EM** *Environmental Management*

safety ♦ performance ♦ cleanup ♦ closure

[www.em.doe.gov](http://www.em.doe.gov)

13

# Contacts

- For further information, contact:
  - Colleen French
    - Department of Energy/RL – Government Programs Manager
      - 509 373-5985 / [colleen.french@rl.gov](mailto:colleen.french@rl.gov)
  - Al Haggerty
    - Mission Support Alliance - Director of Energy Initiatives
      - 509 376-5201 / [alan\\_e\\_haggerty@rl.gov](mailto:alan_e_haggerty@rl.gov)
  - Gary Petersen
    - Tri-City Development Council (TRIDEC) – Vice President
      - 509 735-1000 / [gpetersen@tridec.org](mailto:gpetersen@tridec.org)
  - Download
    - [www.hanford.gov](http://www.hanford.gov)

