Transmission & Generation Development in Wyoming






Wyoming Task Force
On Wind Energy
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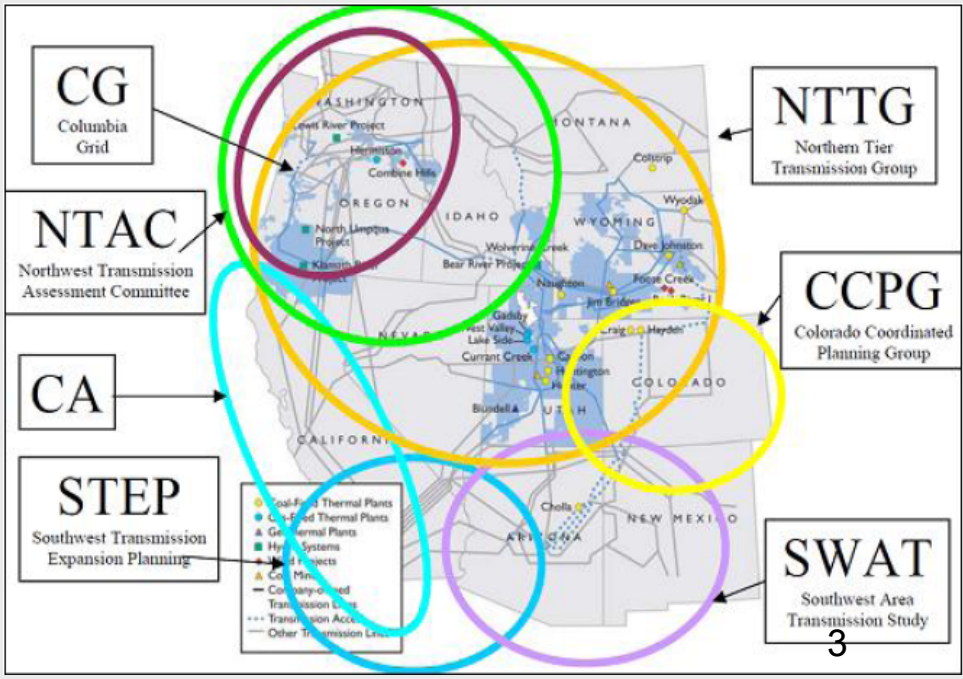
Presentation Outline

- ***A Brief review of Transmission Planning in the West***
- ***Review of Transmission Development in Wyoming***
- ***Risks & Challenges Facing Transmission Developers***
- ***Marketplace Issues***
- ***Wyoming Collector System and feeder lines***
- ***Economic Benefits to Wyoming***
- ***Does Wyoming have a Competitive Position?***

A Brief review of Transmission Planning in the West

- More Federal involvement in regional planning
  - Stage being set for new Federal Energy Regulatory Commission (FERC) Order
  - Pending legislation expanding FERC's role in planning, siting and cost allocation
- Increasing pressure from states and others for more robust planning (e.g. total cost evaluation, longer term planning horizon)
- Better links between Western Electricity Coordinating Council (WECC) Subregional Planning Groups



A Brief review of Transmission Planning in the West

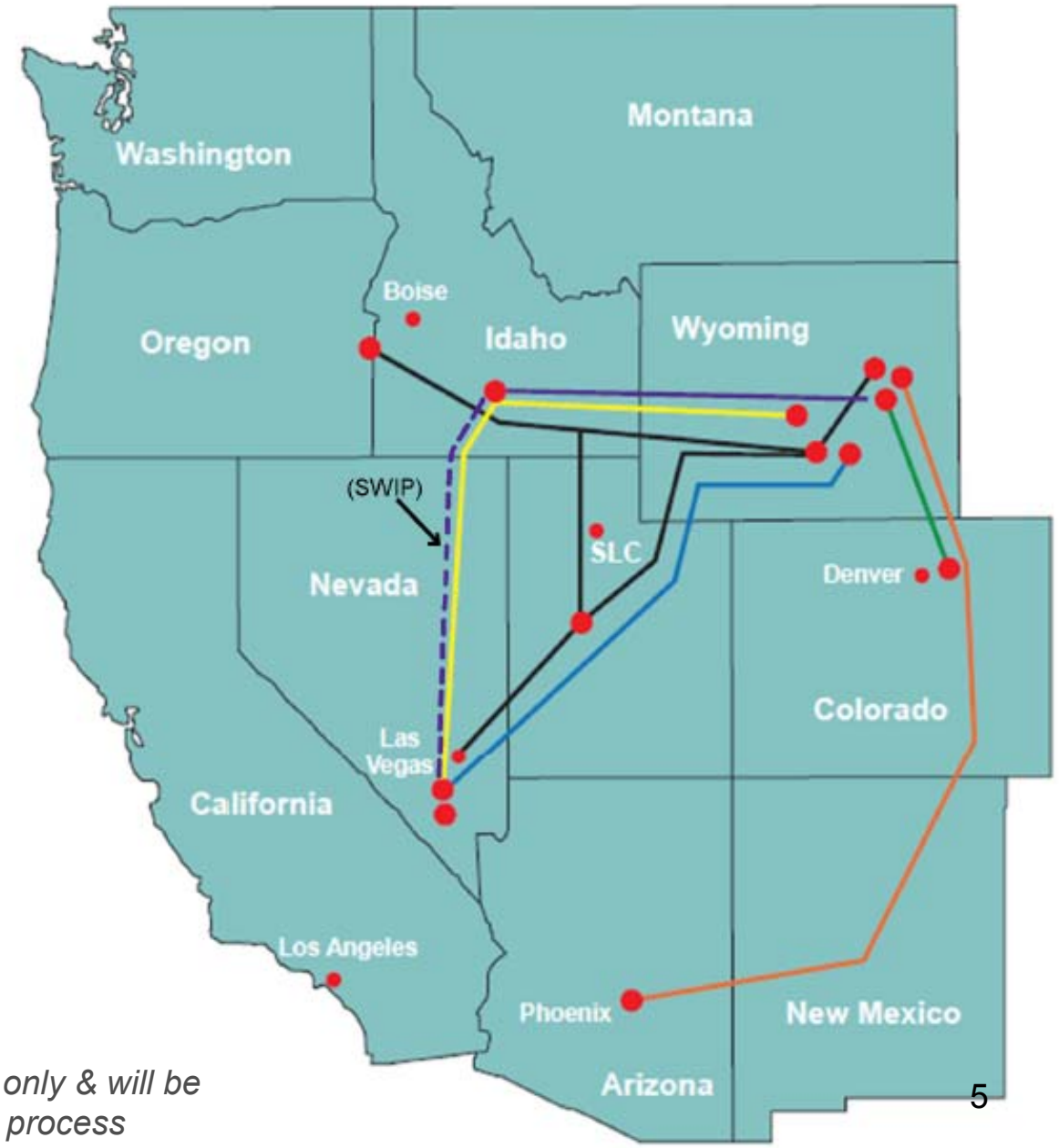
WECC's DOE Funding for Transmission Expansion Planning

- On December 18, 2009, the Department of Energy notified the Western Electricity Coordinating Council (WECC) that it has been awarded $14.5 million in American Recovery and Reinvestment Act (ARRA) funding.
- In addition, the Western Governors Association (WGA) was awarded $12.0 million in ARRA funds.
- The funds will be utilized in conjunction with WECC, the WGA and state PUC's/PSC's to conduct interconnection-wide electric transmission planning studies across the Western Interconnection.
- Thus, a new era of regional transmission expansion planning has dawned.
- What transmission lines will be found necessary as a by-product of the multitude of scenario analyses?

Review of Transmission Development in Wyoming

Projects (*In-service dates*)

Wyoming-Colorado Interie	(2013)
Energy Gateway (West & South)	(2010-2017)
TransWest Express	(2015)
High Plains Express	(2018)
Zephyr	(2015)
Overland Transmission	(2015)



Routes shown are for illustrative purposes only & will be finalized following the permitting and siting process

Challenges in building transmission

Two business models

- Regulated utility (e.g. PacifiCorp) and independent ("merchant") transmission.

High cost of construction

- Construction costs that exceed $2 million per mile, projects cost $Bn's.

Service agreement / contract requirements

- Transmission are 40 to 50 years assets - require long term financing and long term contracts;
- The "chicken or egg" dilemma, aligning customers, manufacturers, transmission providers.

Cost uncertainty

A limited set of factors that can vastly affect costs.

Credit requirements

- Transmission customers provide credit support for a long term PPA.
- Often the credit requirements far exceed a developer's capability.

Schedule risk

- Uncertainty with permitting, material procurement, contractor availability etc.

Sitting and Permitting

- Conflicts between local, statewide and regional interests. No access to FERC.
- WECC separation critieteria at odds with environmental issues.
- Constraints within the Bureau of Land Management (BLM), the Forest Service etc.

Operating Challenges

- Supply and demand for electricity must be kept constantly in balance.
- Risk of regional blackouts (as in Northwest in 1996 and Northeast in 1965, 1977 and 2003).
- Risks increases significantly with < 15,000 MW wind. Structures do not exist to manage this.

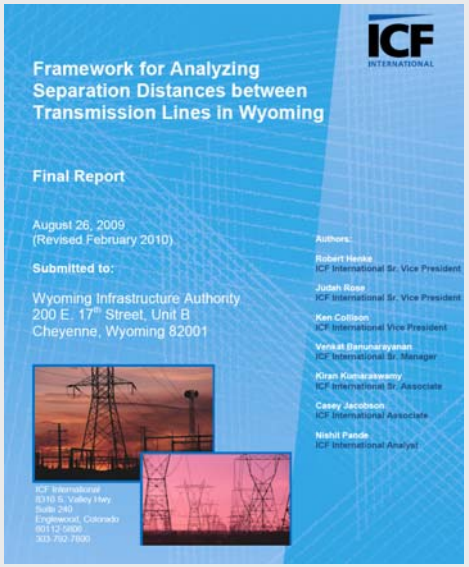
Risks & Challenges Facing Transmission Developers

Governor Freudenthal's Objective

- East to West Corridor through “pinch points” in Wyoming & Idaho

Precedent-Setting Independent Line Separation Study

- Funded by the Wyoming Infrastructure Authority
- Technical Analysis performed by ICF International with a report published on August 26, 2009
- Major conclusion: a spacing of 1500 feet is adequate
- Available for download at: www.wyia.org



WECC’s Continued Cooperation on Line Separation Requirements

- Ongoing discussions with the Governor’s office

Supply and Demand for Renewable Energy

Demand for renewable energy

- Growing demand for electricity; CO2 reduction targets; RPS goals.
- Most Western states self-sufficient in renewable energy.
- California the key market, but focused on keeping new jobs in-state.

Quality is not universal

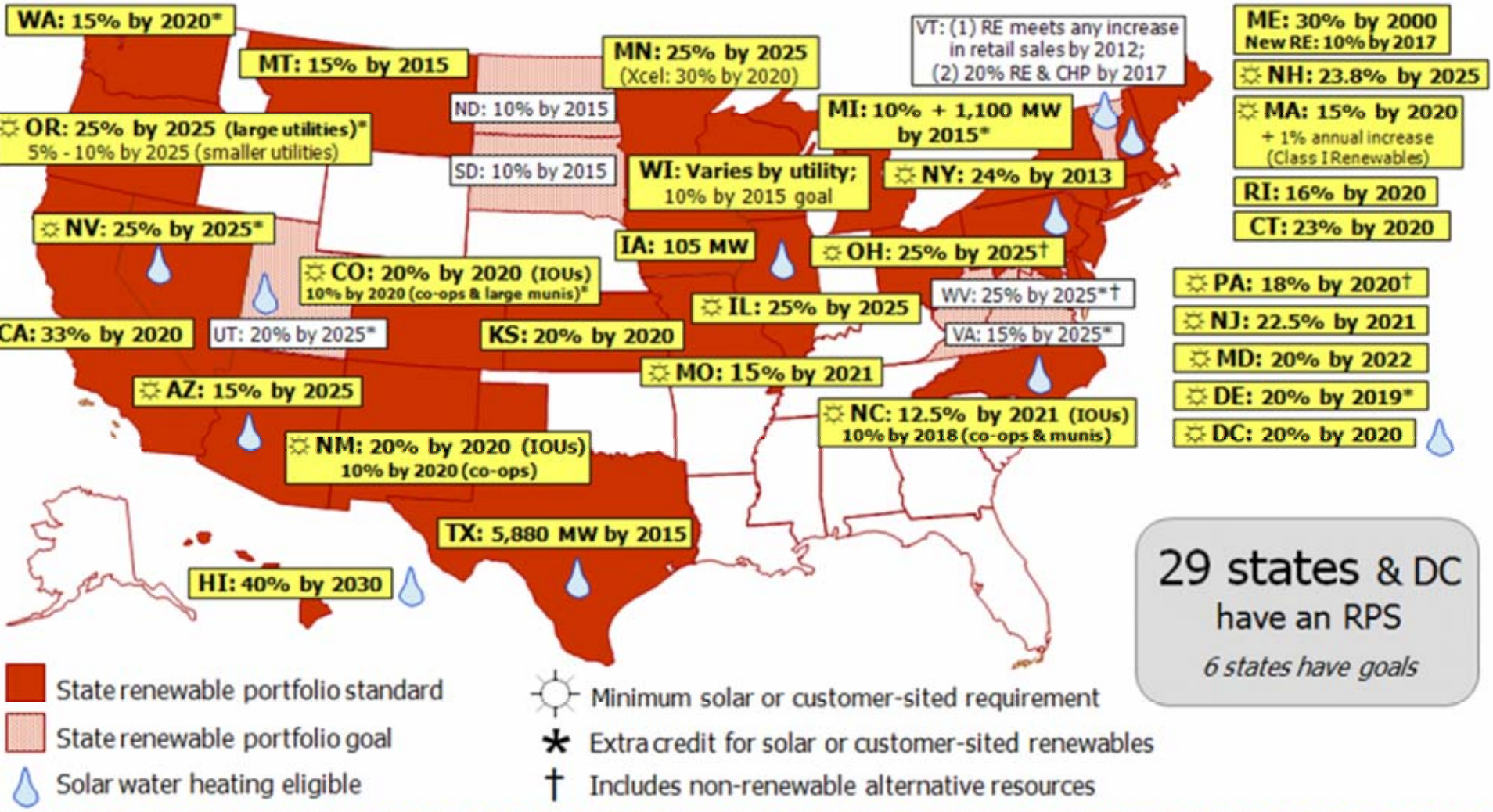
- Wyoming wind resource produces the least during summer peak demand.

Supply of renewable energy

- Geothermal; small hydro; biomass; solar and wind – all have issues.
- Initial reports placed Wyoming Class 6 and 7 wind competitive. Subsequently:
  > moves by California to limit imports (accept T-RECS) damaging;
  > 20 – 25% efficiency loss due to higher altitudes understood and damaging;
  > restrictions by Wyoming on development areas unhelpful;
  > fall in natural gas price undermining competiveness of renewables / wind;
  > the tax burden on Wyoming wind resource higher than surrounding states;
  > other states becoming more competitive with incentives.

Renewable Portfolio Standards

www.dsireusa.org / November 2009



29 states & DC have an RPS

6 states have goals

State renewable portfolio standard

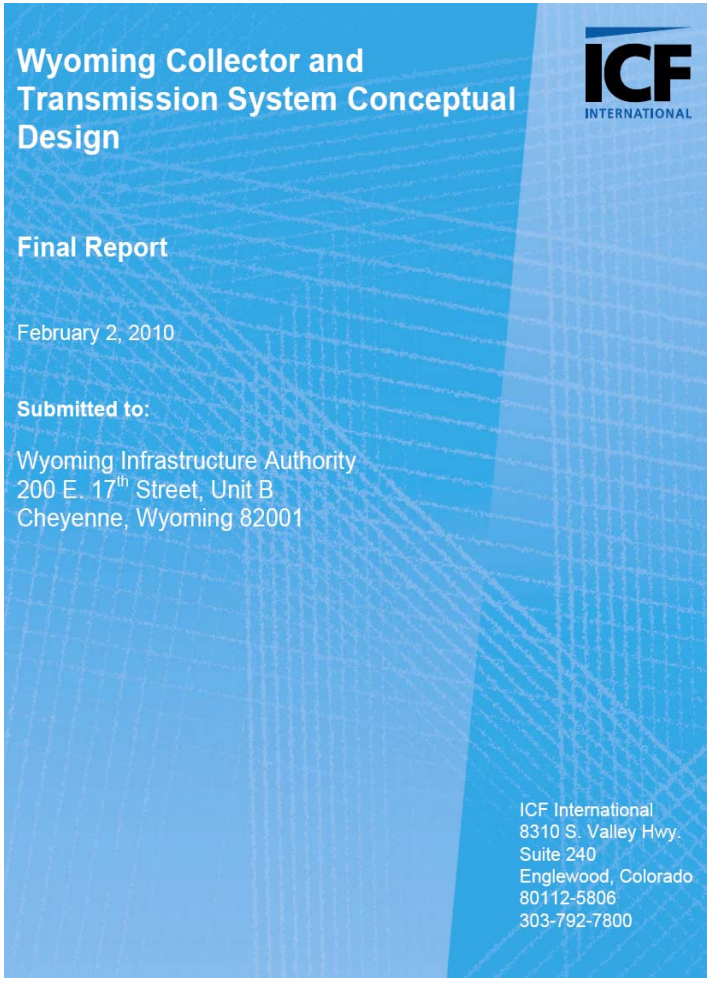
State renewable portfolio goal

Solar water heating eligible

Minimum solar or customer-sited requirement

* Extra credit for solar or customer-sited renewables

† Includes non-renewable alternative resources



Wyoming Collector System Report February 2, 2010

Task Force Members

Western Area Power Administration

TransCanada

PacifiCorp

LS Power

TRANSWEST EXPRESS LLC

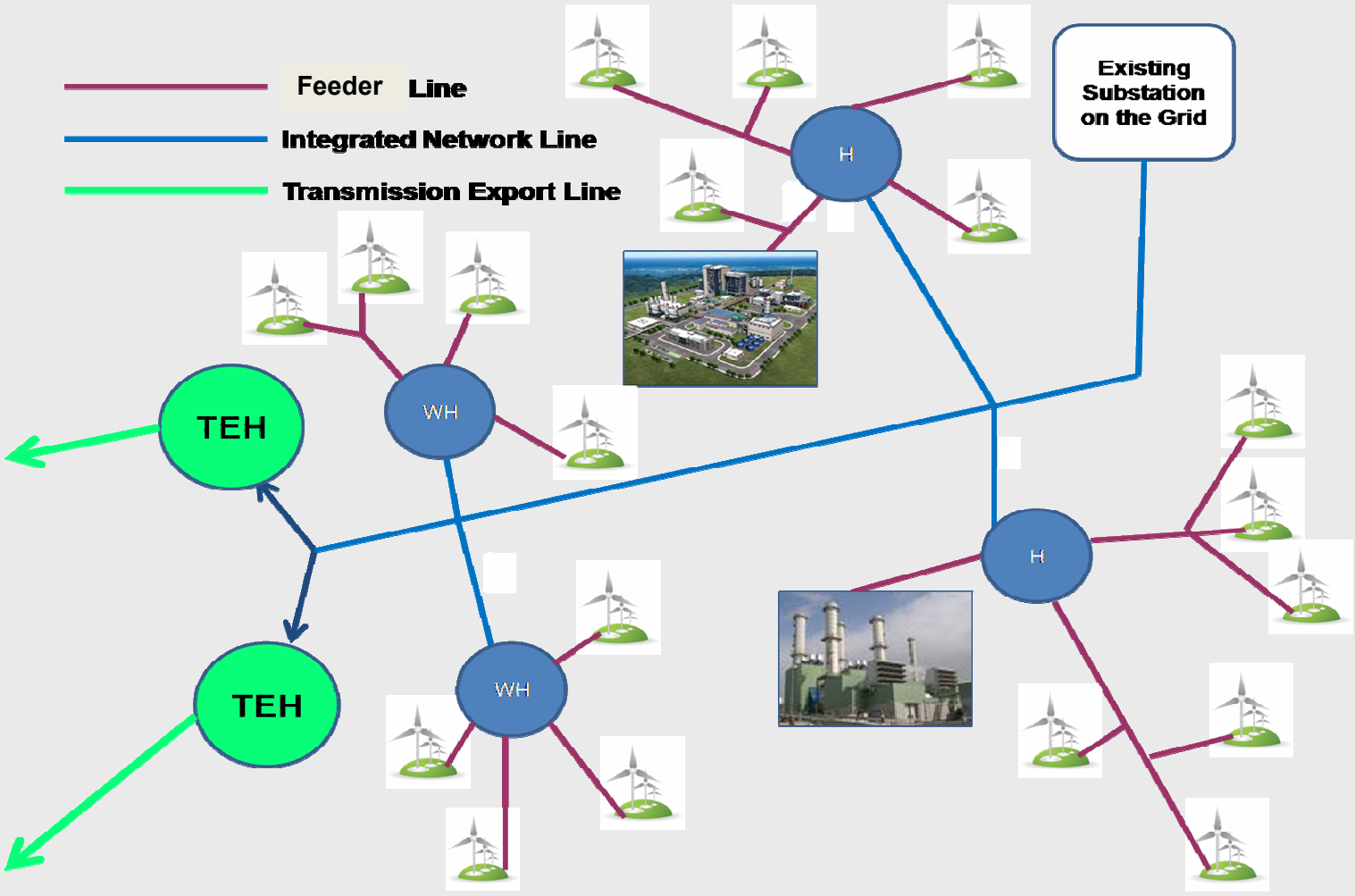
Available on the WIA's site at:
www.wyia.org

Wyoming Infrastructure Authority

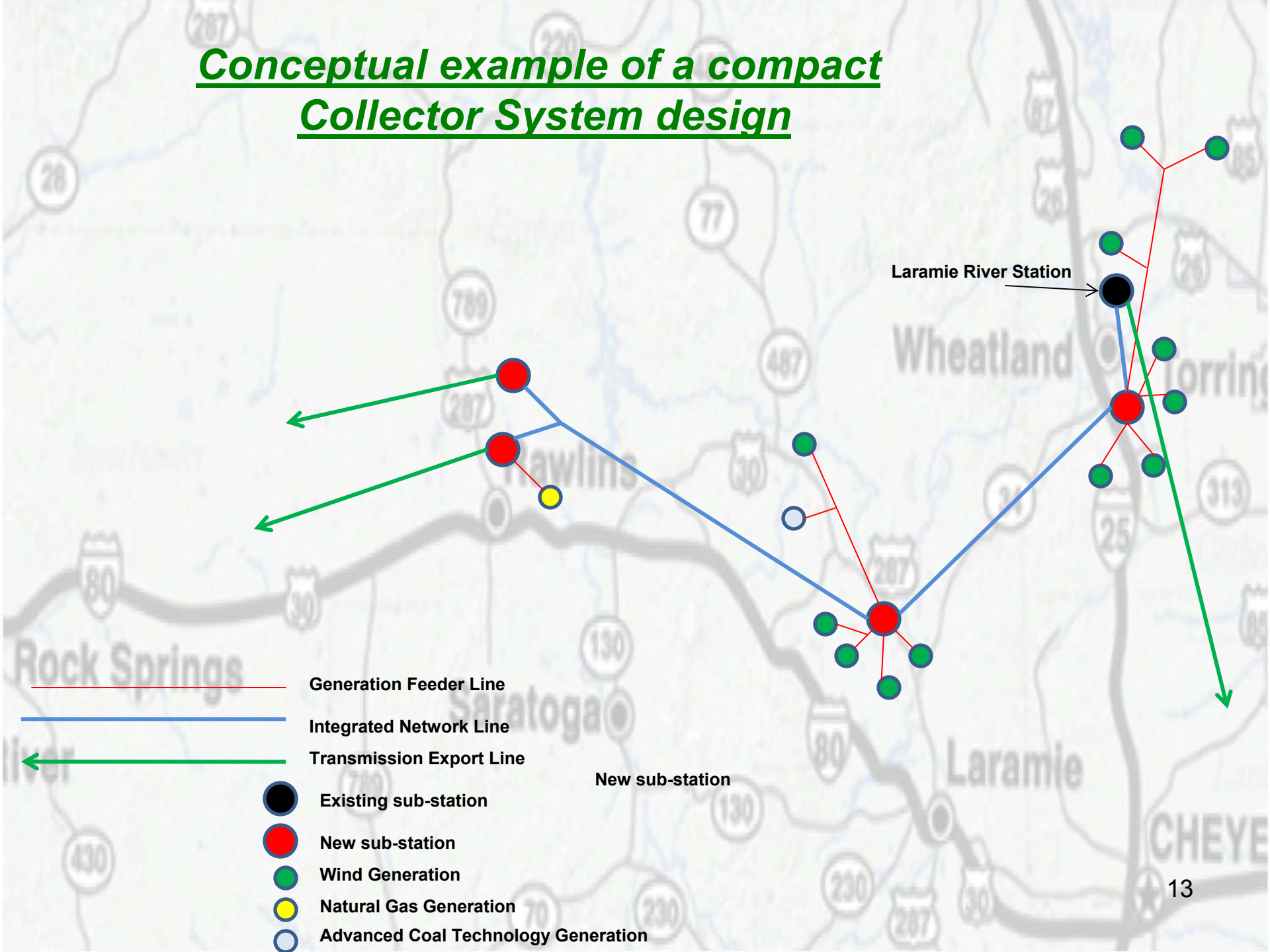
Collector System

- Should ~ 12GW of export transmission capacity be built there is a need for a centrally organized collector system (network).
- This would interconnect with, and reinforce, the existing Wyoming transmission networks (PacifiCorp, WAPA, Black Hills). This would be an open access, FERC regulated, Wyoming transmission grid.
- Network may have multiple owners and business structures. Western being encouraged to lead development as a PPP.
- Not to be confused with individual generator tie (feeder) lines.
- In May 2009, the WIA and WAPA led the formation of the Wyoming Collector System Task Force to study business and design options.
- In the absence of hard data on wind and transmission projects, and with a need to gather cost and design data, ICF February 2010 report commissioned by WIA and supervised by Task Force.
- ICF report not a suitable tool for planning ROW / permitting issues.

Collector System Example



Conceptual example of a compact Collector System design



Economic benefits

Linear transmission infrastructure

- Transmission is 70 year + linear infrastructure - like roads and railways.
- Lines will likely bring Wyoming multiple long term benefits that are not foreseeable today – just as the inter-state railroads and highways did.

Foreseeable economic benefits of planned developments

- Wind related employment opportunities in the short-term and long-term.
- Multiplier effect of wind related employment opportunities.
- Wind focused property taxes, revenue sources.

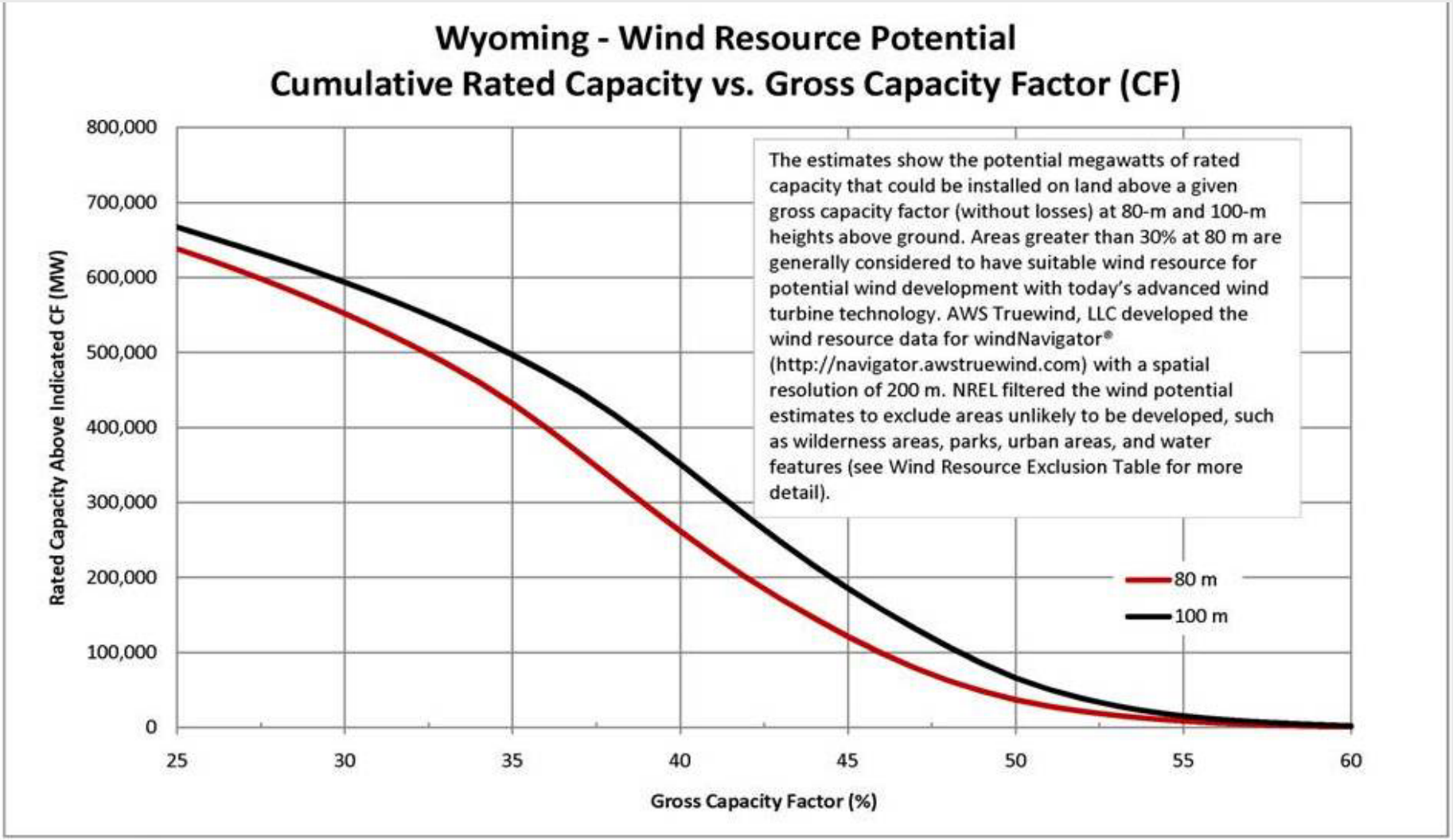
Potential economic benefits of planned developments

- Employment opportunities, revenues, from significant new natural gas fired generation (required to balance intermittent wind generation).
- (In the future, potentially), CO2 sequestration based technologies, for both natural gas fired generation and mine mouth generation facilities.

It's not just about Wind

- When considering that the average capacity factor for wind in Wyoming is approximately 45%, there will be 55% of the transmission capacity empty, on average throughout the year.
- The WIA has been very active in promoting natural gas-fired generation to both address the integration issue of wind **and** creating another market for a significant resource in our State (natural gas). We expect that for 9,000 MW of transmission built, there will be a demand for up to 90,000 MMBTU/day of demand for natural gas to "firm" wind energy connected to transmission.
- With the continuing strides being made in carbon capture and storage (CCS), power generation utilizing advanced coal technology is poised on the time horizon to become an integral part of serving electrical load growth in the West. The more transmission infrastructure that is built, the more markets that will be available to such technology in the future (Advanced coal technology will also increase revenues to the State relative to substantial production of transportation fuel).

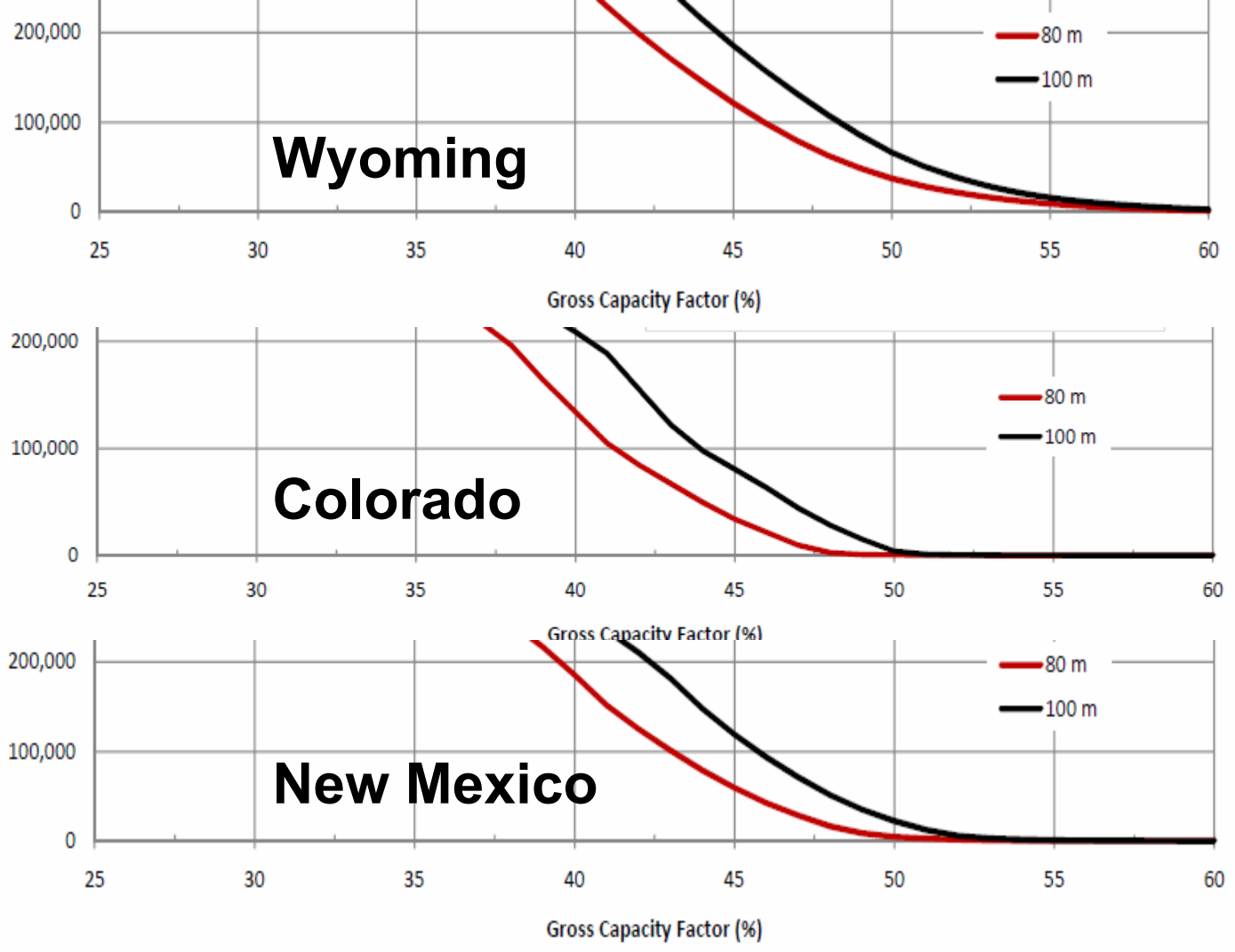
Does Wyoming have a Competitive Position?



National Renewable Energy Laboratory
Innovation for Our Energy Future

AWS Truewind

Wind Quality Comparisons with Other States



Wyoming isn't the only state in the West with a quality resource

Source: NREL & AWS Truewind

Every 1% increase in the capacity factor generates over $20 Million in annual revenues for 3,000 MW of wind generation

Questions

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