



Minnkota Power
COOPERATIVE

A Touchstone Energy® Cooperative 



LIGNITE *Energy* **COUNCIL**

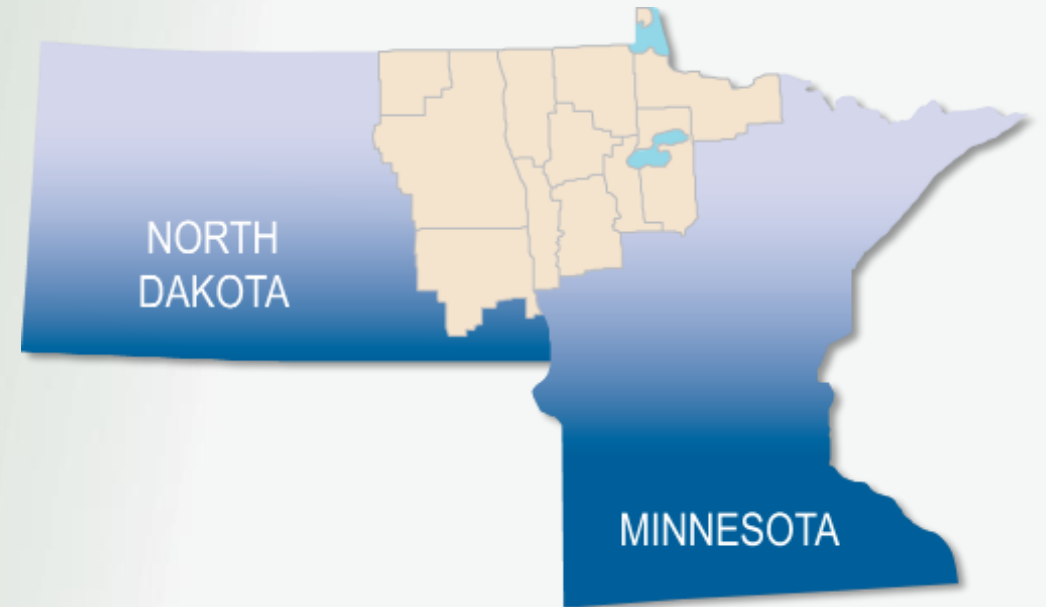
Carbon Solutions Panel

LEC Fall Meeting, October 5, 2017

Craig Bleth - Environmental Manager
Minnkota Power Cooperative

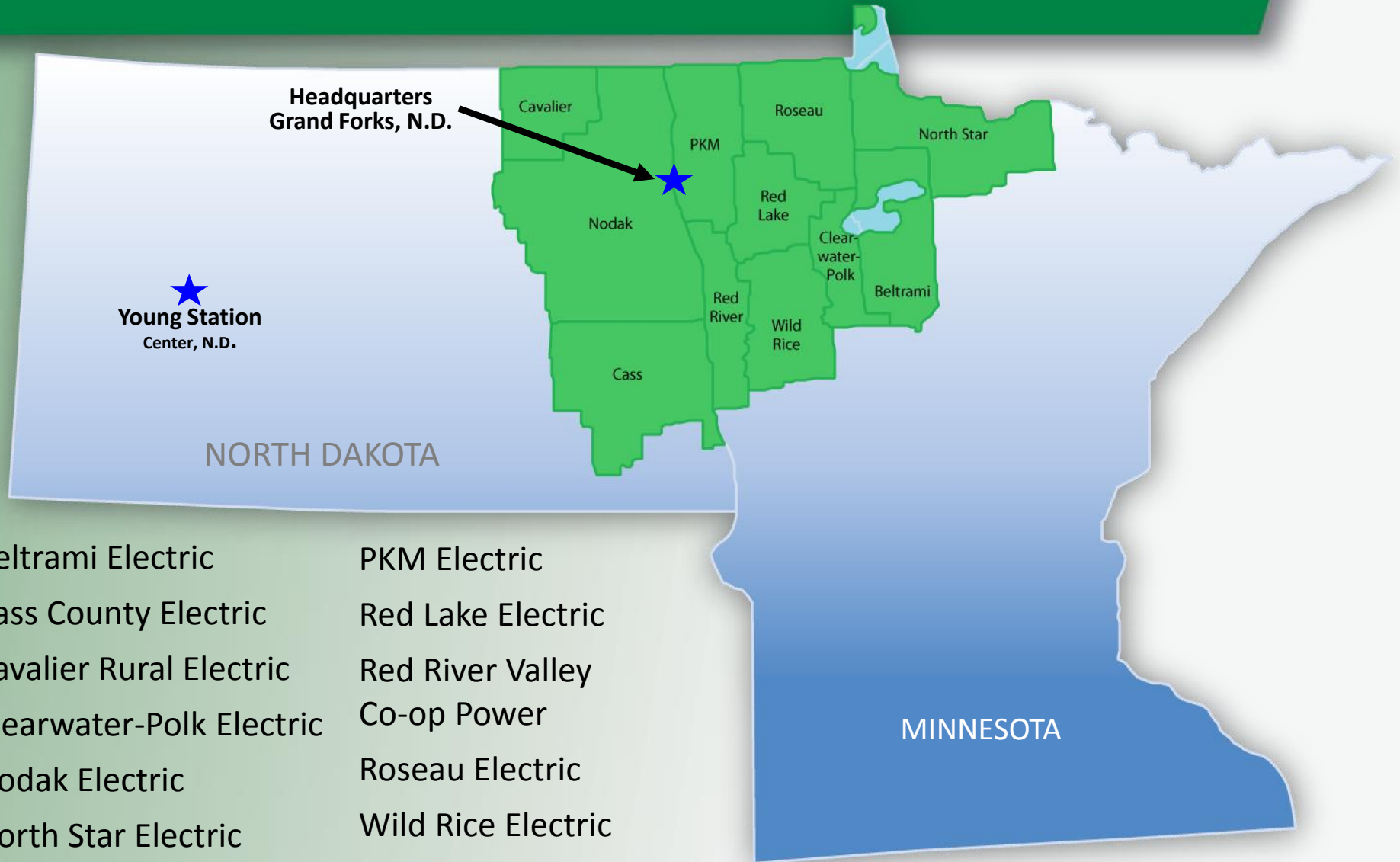
Minnkota Power Cooperative

- Wholesale electric generation and transmission cooperative formed in 1940
- 11 member-owner cooperatives
- 12 municipals – Northern Municipal Power Agency
- About 143,000 customers served
- 395 employees (183 at the plant, 212 in Grand Forks)






A Touchstone Energy® Cooperative 

Minnkota's Co-op Membership



2017 Generation Resources

			<u>MW</u>	<u>Startup</u>
	Young 1	Coal	250	(1970)
	Young 2	Coal	355	(1977)
	Coyote	Coal	128	(1981)
<hr/>				
	WAPA	Hydro	109	
<hr/>				
	Wind	Wind	459	
<hr/>				
	Other	Misc.	<u>34</u>	
			1,335	



Coyote Station
Beulah, N.D.



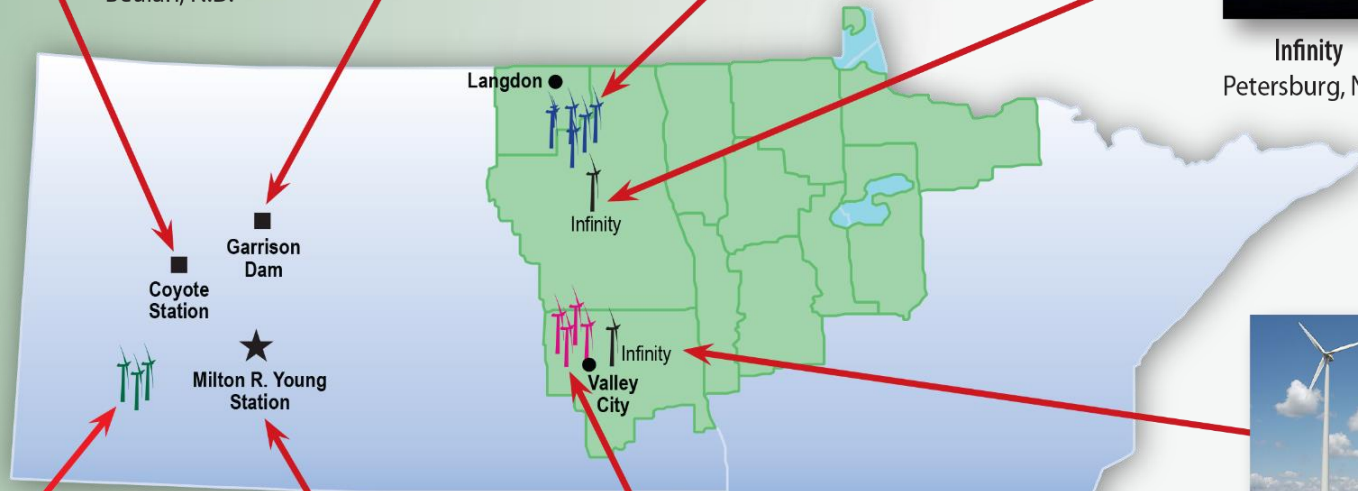
Garrison Dam
Missouri River



Langdon Wind Energy Center
Langdon, N.D.



Infinity
Petersburg, N.D.



Oliver III Wind Farm
Center, N.D.



Milton R. Young Station
Center, N.D.



Ashtabula Wind Energy Center
Valley City, N.D.



Infinity
Valley City, N.D.

Young 1

1970



Young 1 Statistics

- 257 MWg
- 100% owned by Minnkota
- OFA/SNCR/FGD

Young 2

1977

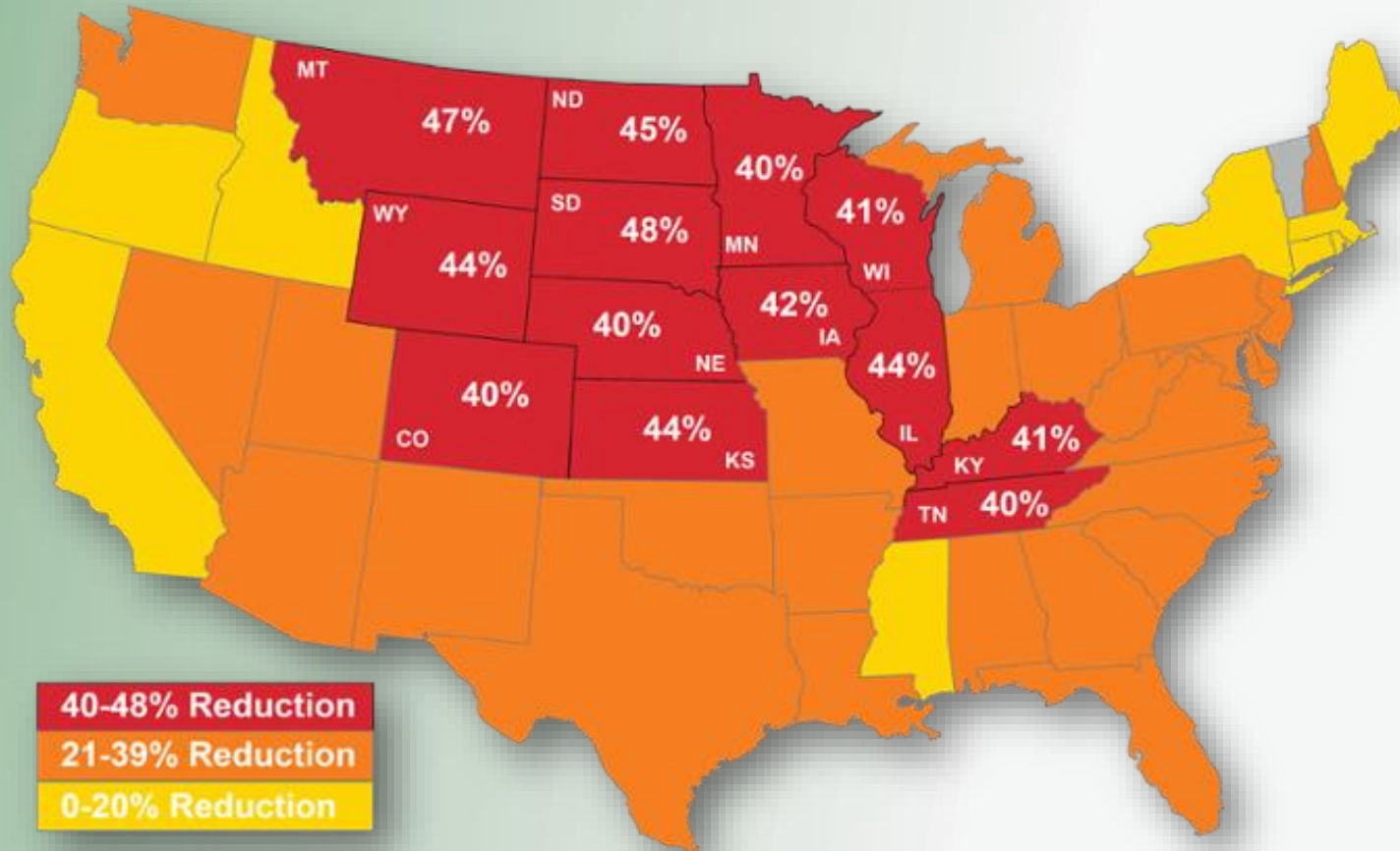


Young 2 Statistics

- 477 MWg
- Owned by Square Butte
- Purchased power by Minnkota and Minnesota Power
- Operated by Minnkota
- OFA/SCNR/FGD

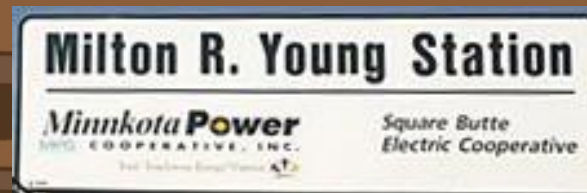
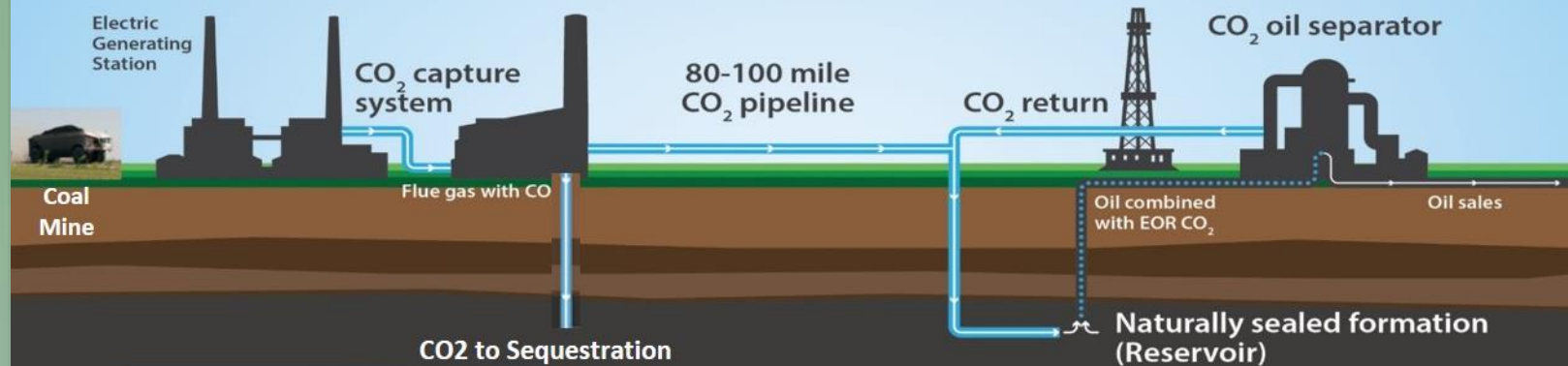
Why Project Tundra?

Clean Power Plan



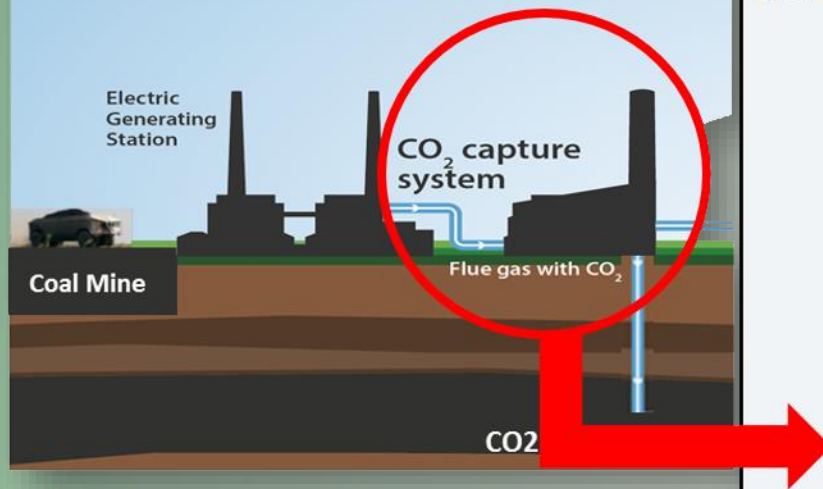
What is Project Tundra?

Utility Industry Carbon Solutions – Project Tundra

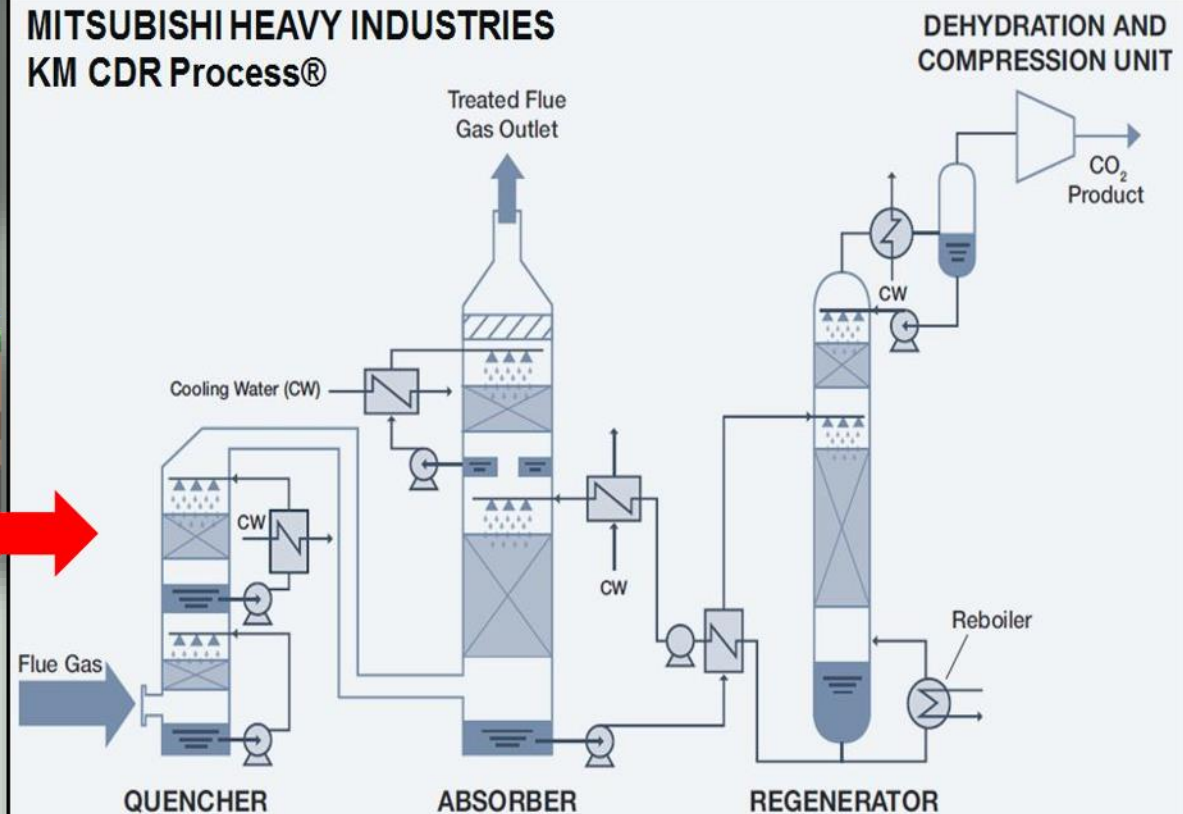


Existing Fleet Technology Solution

Utility Industry Carbon Solutions – Existing Plants

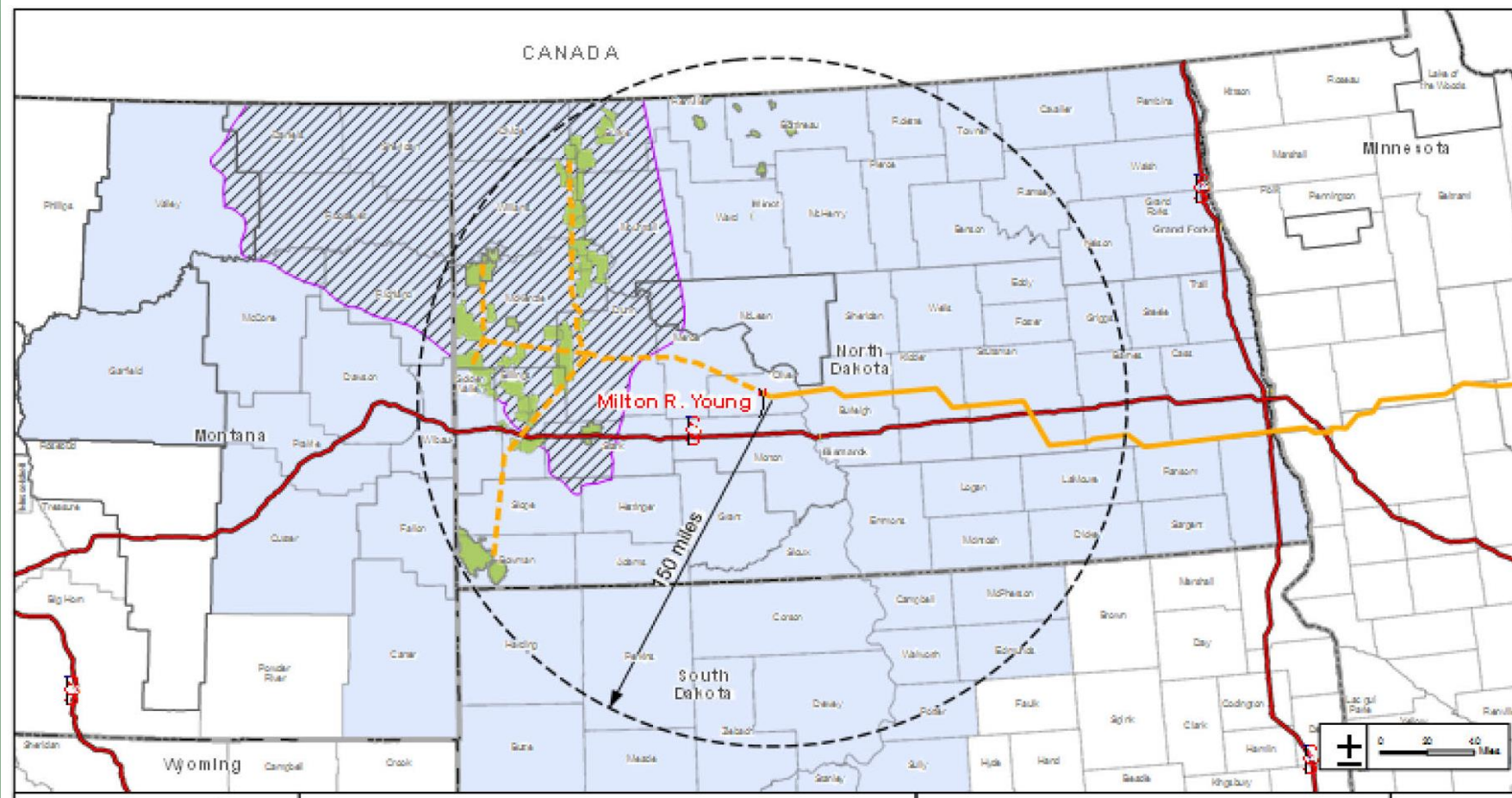


MITSUBISHI HEAVY INDUSTRIES KM CDR Process®



KM CDR Process is a registered trademark of Mitsubishi Heavy Industries, Ltd., in Japan, the United States of America, European Union (CTM), Norway, Australia, and China. Figure © Mitsubishi Heavy Industries America, Inc.

Key - Proximity to Oil Fields



Why Here, Why Now?

- Future carbon compliance for units that have long remaining useful life
- Ideal setting - proximity to oil fields amenable to EOR
- Preserve/enhance the use of abundant North Dakota lignite resources
- Provide next step in demonstrating PCC with a significant scale-up and using low rank fuel
- Apply lessons learned from Petra Nova and other projects
- Take advantage of more recent technologic advancements



Next Steps

- Continue determining technical and economic feasibility
- Resolve technical issues related to PCC on lignite units (Project Carbon)
- Evaluate offtake solutions
- Work with North Dakota officials and other key stakeholders on continued project support



Project Participants

Working Together to Accelerate Lignite
Power Generation R&D

