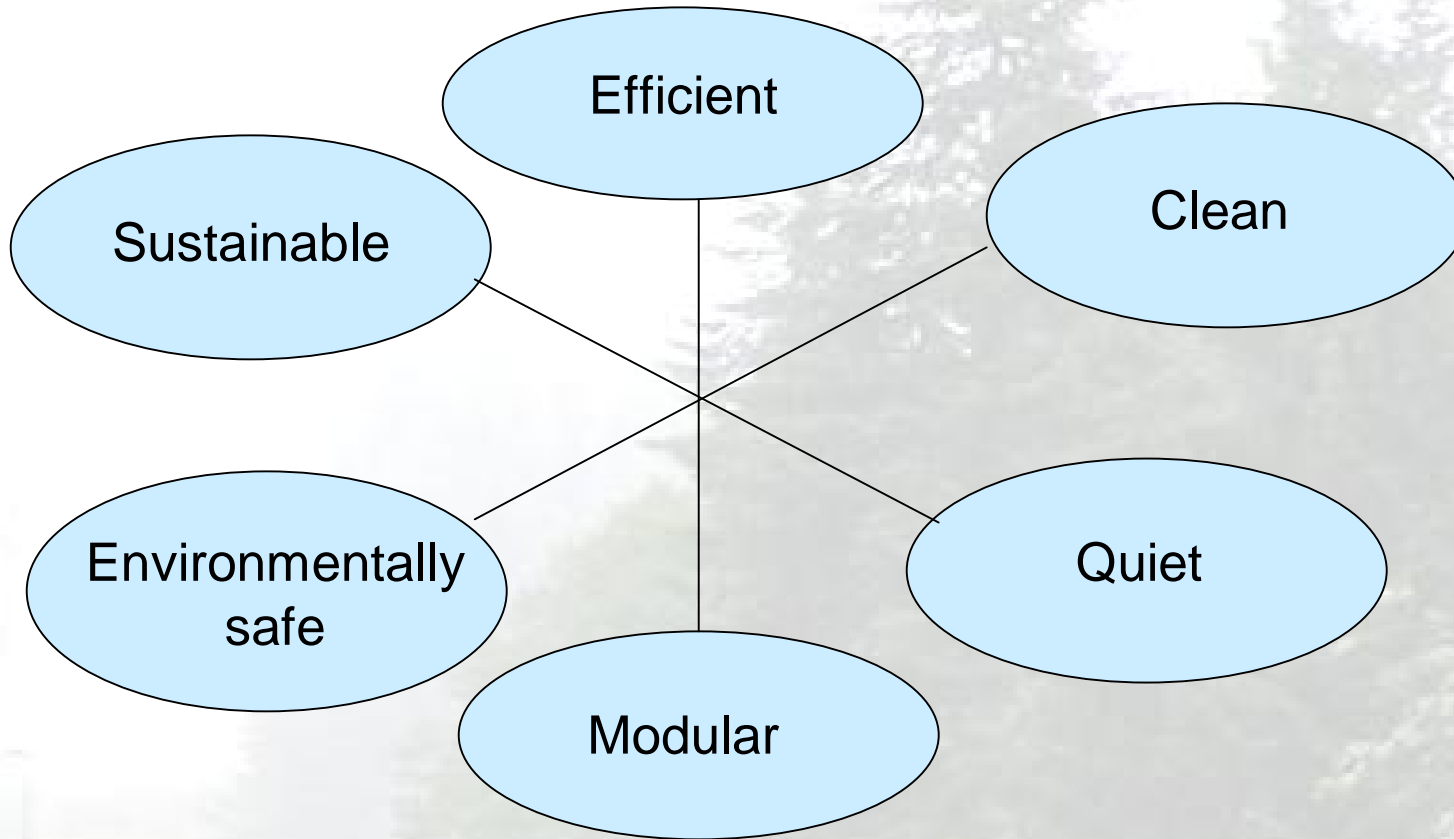


Fuel Cell Benefits and Challenges

Mira Vowles, PE

Montana Energy
Symposium
October 19, 2005

Fuel Cell Benefits



Challenges

- § Cost effectiveness
- § Codes and standards
- § Interconnection
- § Siting and Permitting
- § Standby charges
- § Stranded costs

Who benefit from fuel cells?

- n Nation
- n State
- n Utility
- n End user
- n Others

US Benefits

- n Economic development
- n Energy security
- n Cleaner environment
- n Grid reliability

Fuel Cell Provisions in Energy Policy Act of 2005

- n \$3.8B for RD&D
- n Commercial bldg deductions
- n Production incentives
- n Tax credits

State Benefits

- n Economic development
- n Energy security
- n Cleaner environment
- n Grid reliability
- n Consumer choice
- n Technology Leadership

Encourage a Fuel Cell Market

- § Place priority on energy security, air quality, power reliability and fuel diversity
- § Create a hospitable environment for fuel cell technology investments
- § Include fuel cells in definition of clean technologies and vehicles

Examples from other states

- § Support demonstration projects
- § Tax credits
- § Sales tax exemptions
- § Include in RPS
- § Fund university R&D

Other Options

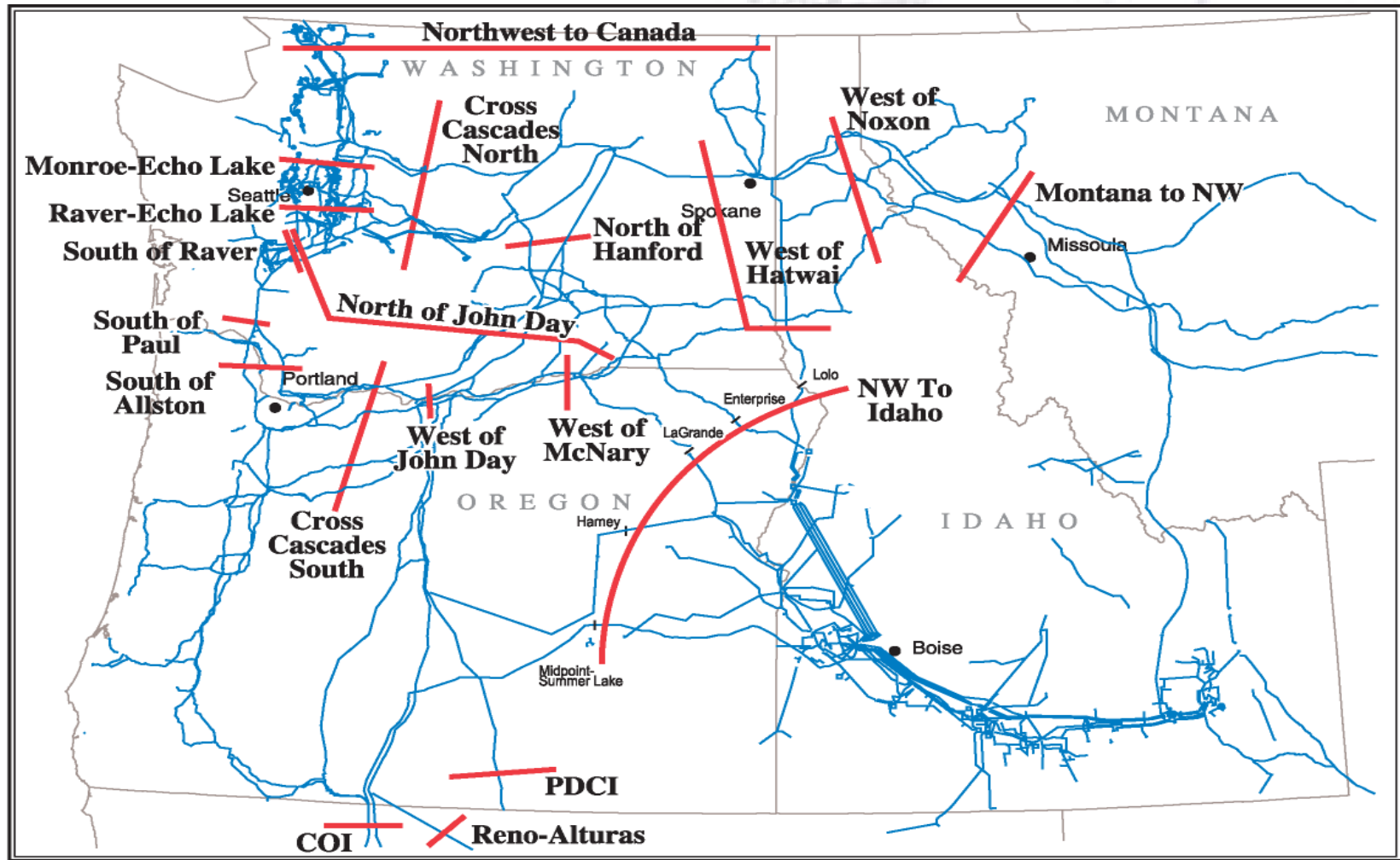
Combined Heat and Power Consortium

- n Supports demonstration projects
- n Compiles and shares information
- n Education and outreach

Utility Benefits

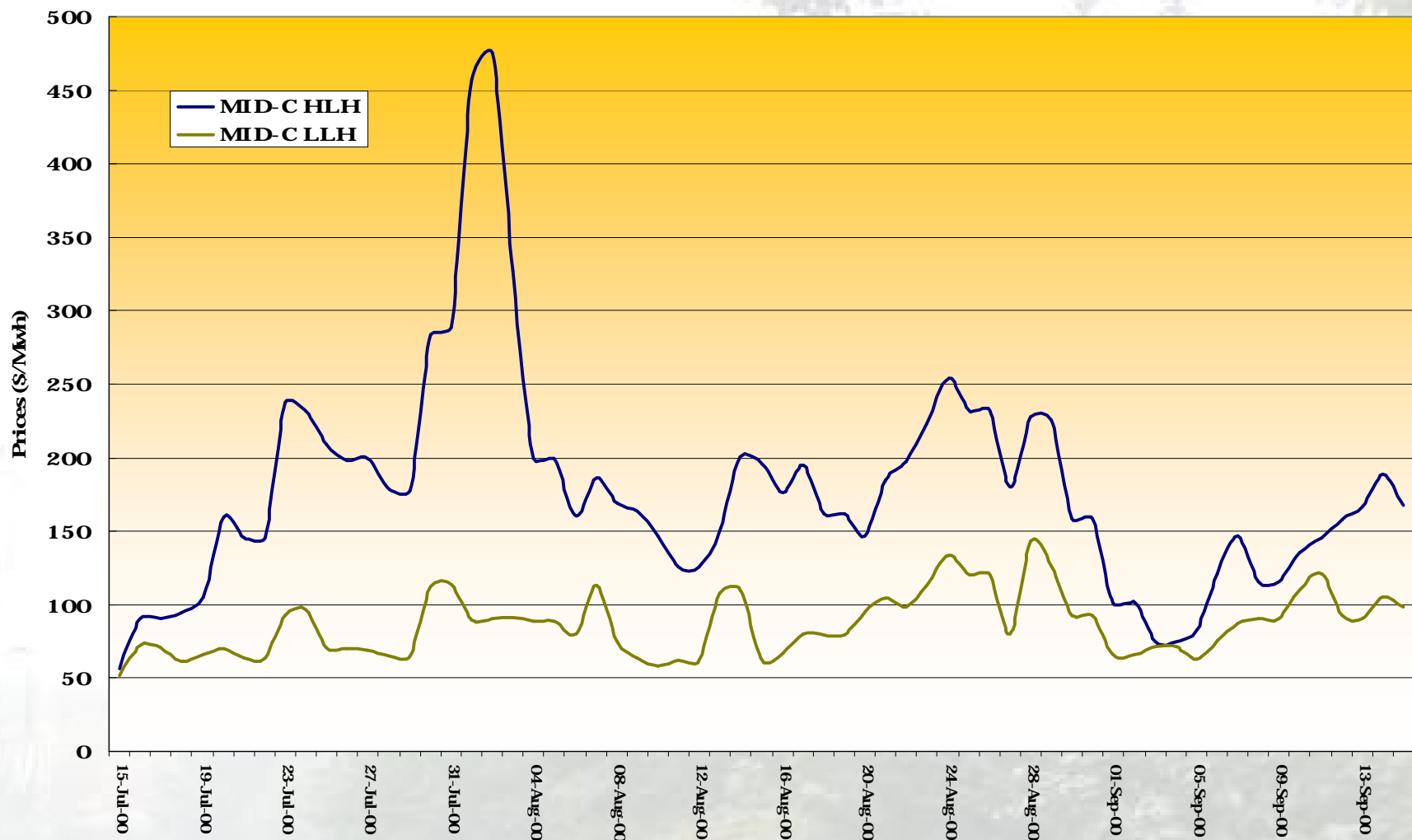
- n Relieves line congestion
- n Reduces line losses
- n Lowers exposure to price peaks
- n Alternative to line extensions
- n Back-up generation
- n Easier emissions permitting

Reduce loads on constrained lines



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Lower exposure to price peaks

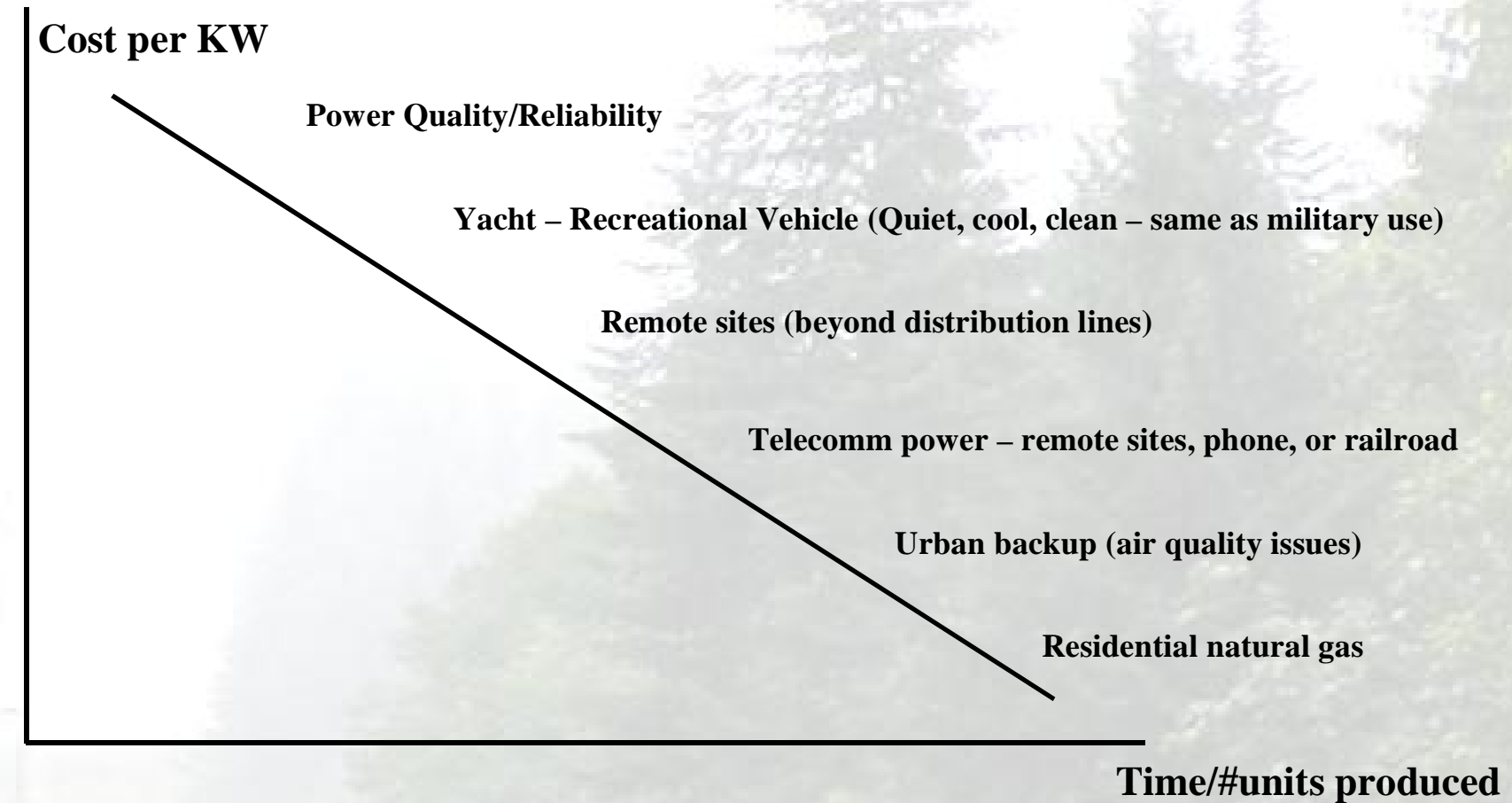


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User Benefits

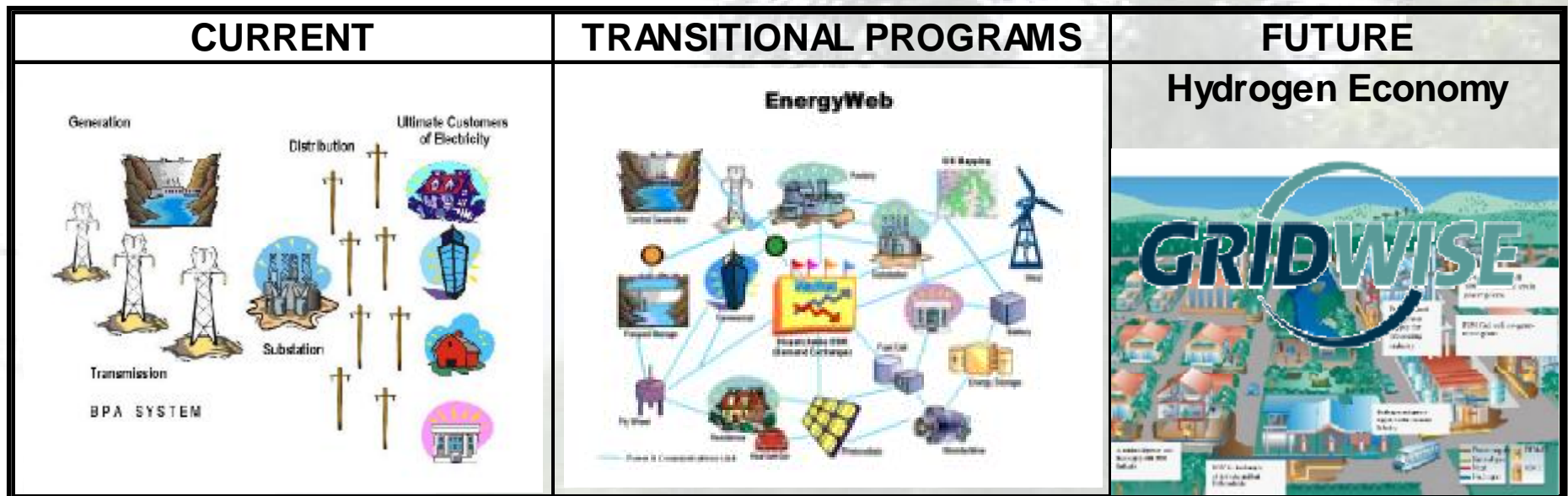
- n Alternative to line extensions
- n Back-up generation
- n Uninterruptible power supply
- n Operates on renewable fuels and may not require emissions permitting

Possible fuel cell adoption curve

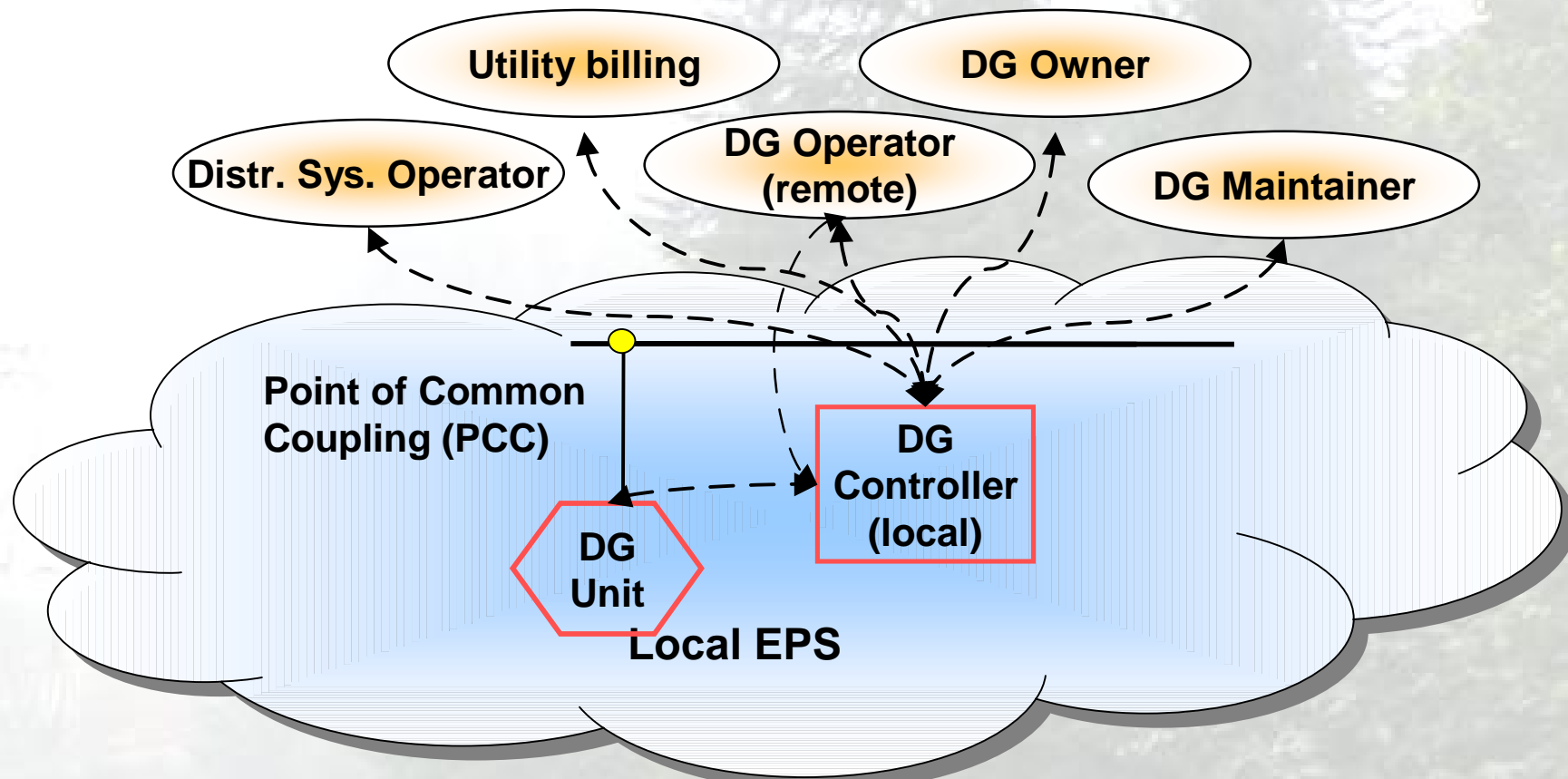


Distributed Power implementation slope - high value comes first

The Energy Future



Real Time Information Exchange



Montana Demonstration Projects



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