

Increasing industrial efficiency through combined heat & power

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Today

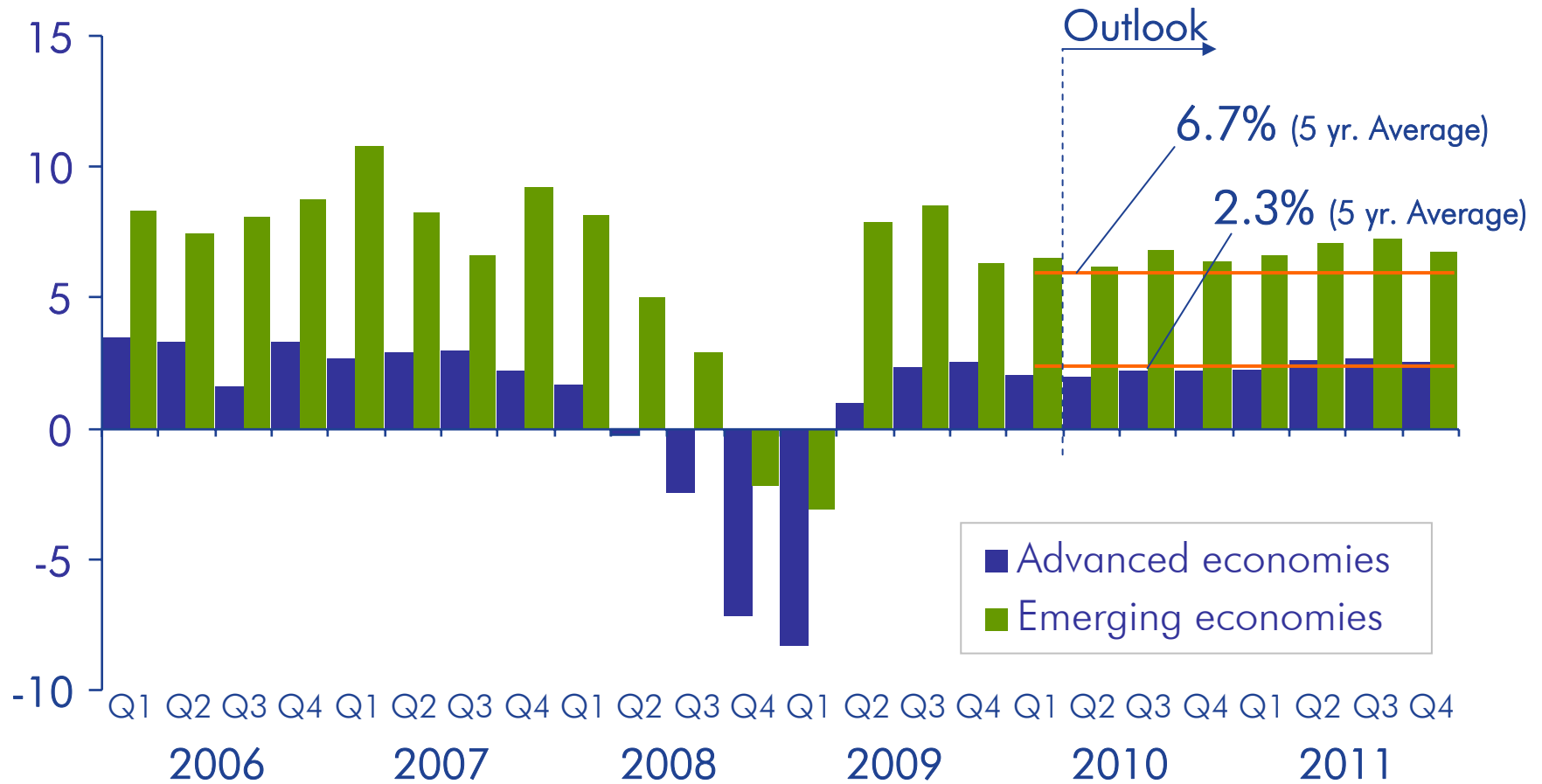


2030



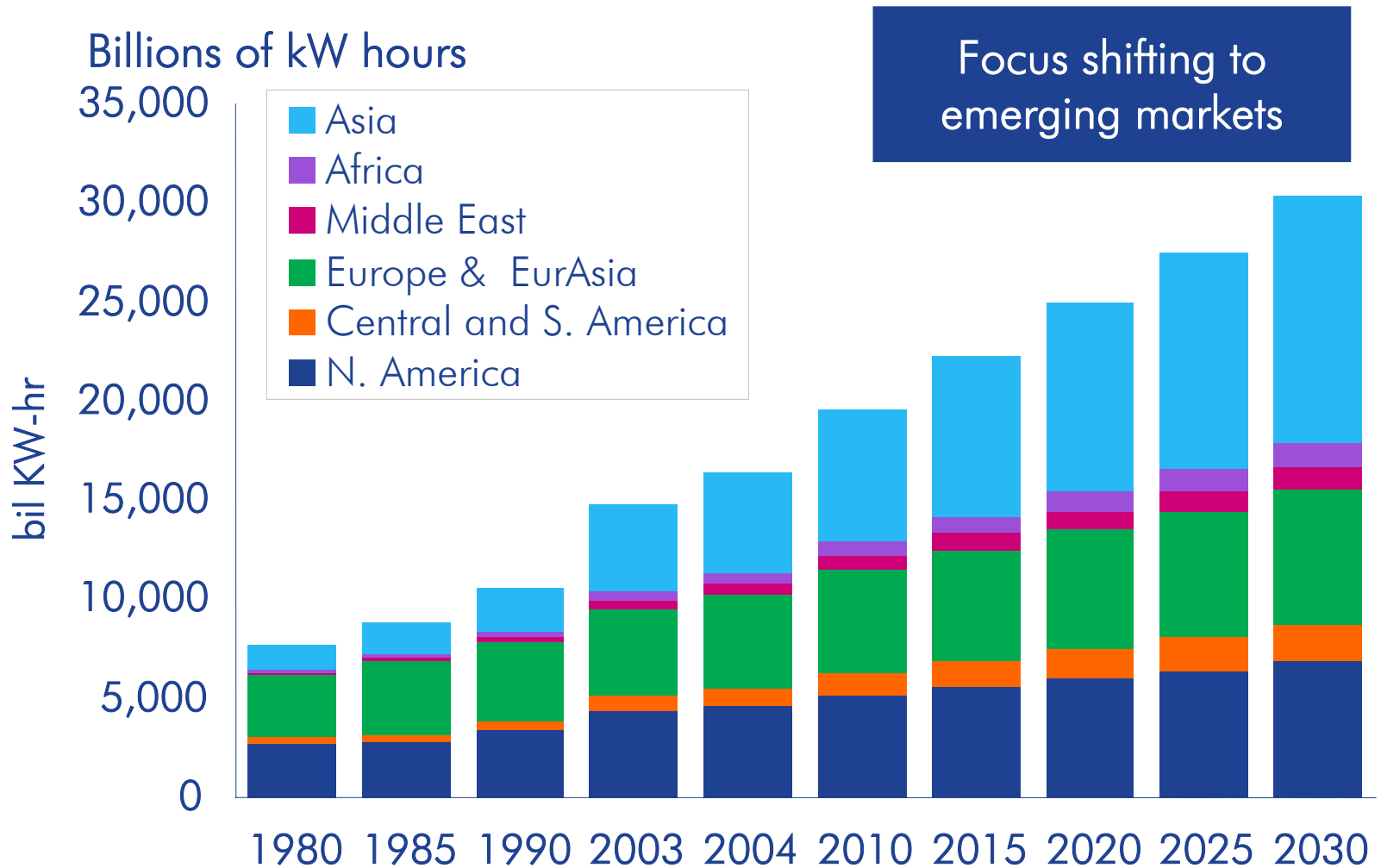
Two speed world

Emerging economies growing 3x faster



Source: IMF World Economic Outlook January 2010

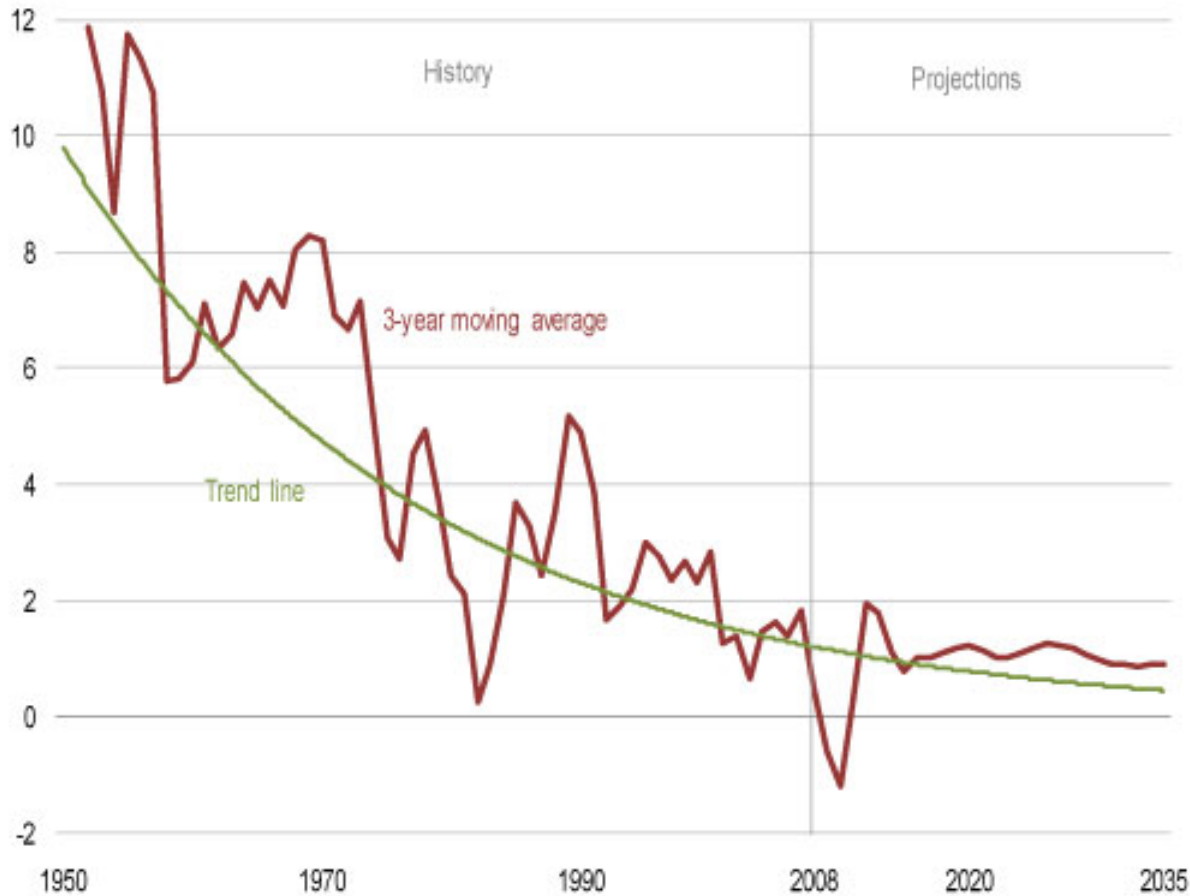
Electricity demand ... 2X by 2030



Sources: EIA-DOE International Energy Annual 2004 & International Energy Outlook 2006

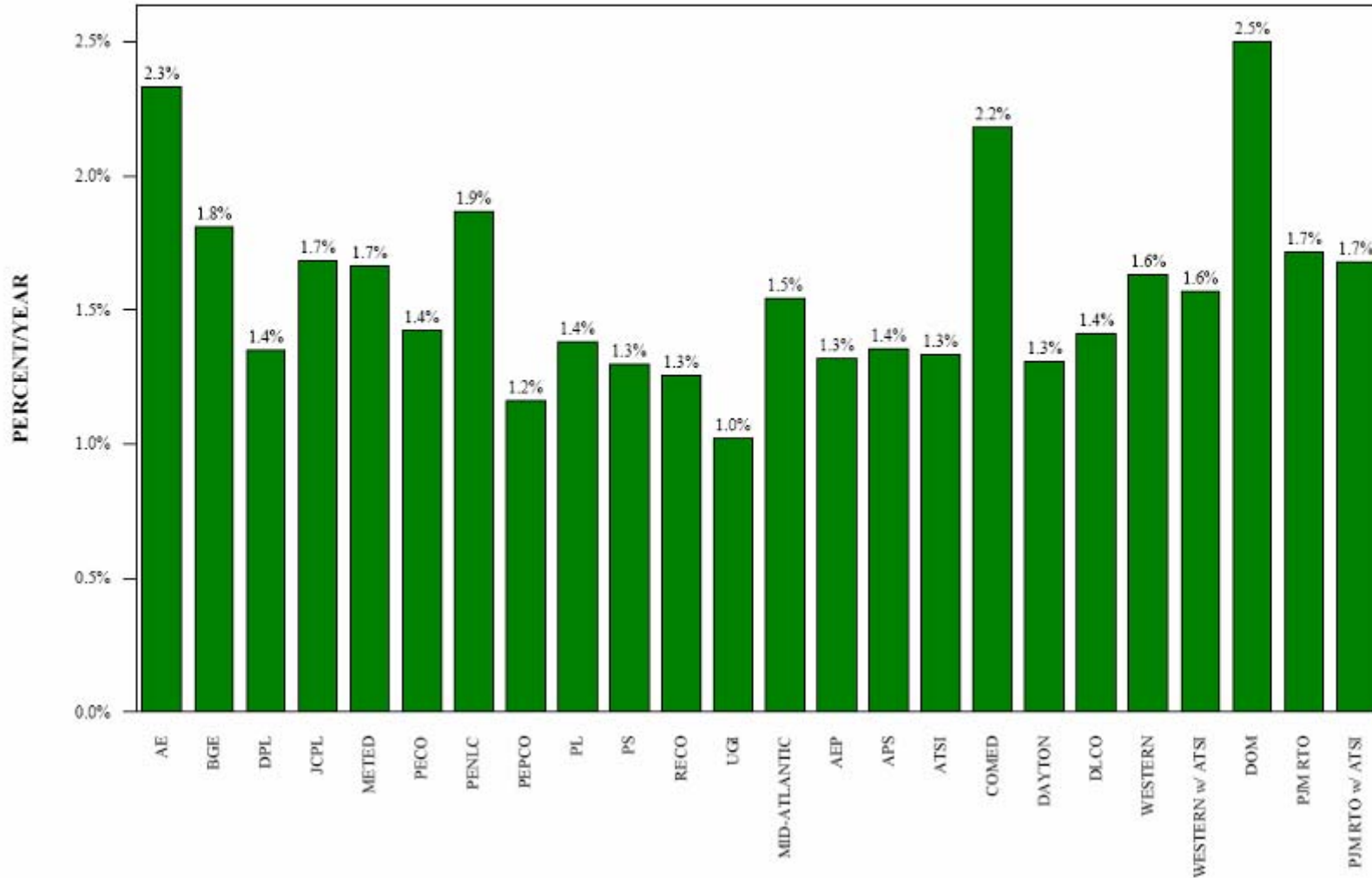
US electric demand growth modest

Figure 59. U.S. electricity demand growth 1950-2035
percent, 3-year moving average



Steady growth in Virginia

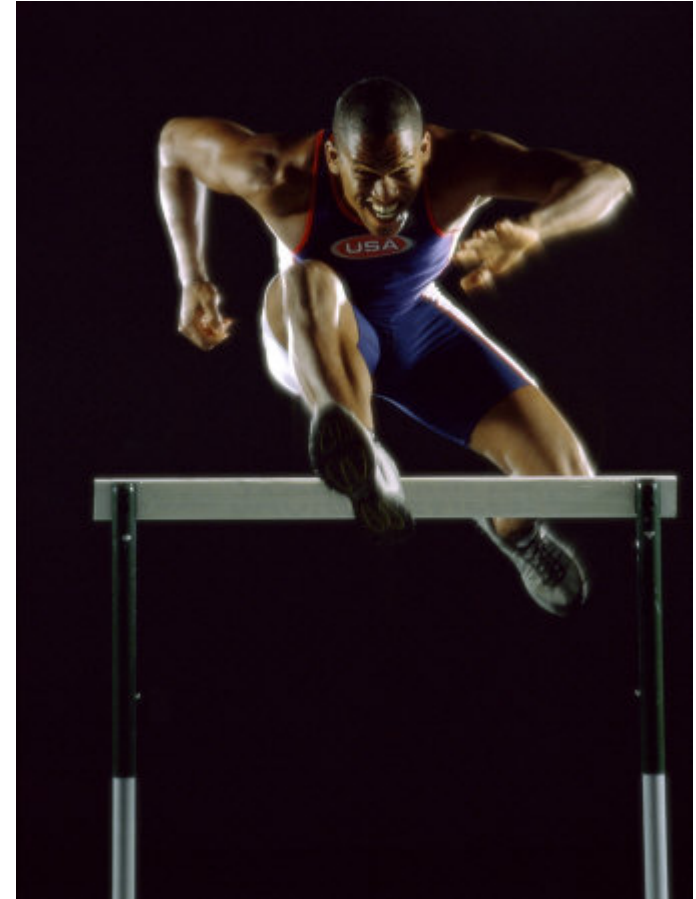
PJM SUMMER PEAK LOAD GROWTH RATE
2010 - 2020



Source: PJM Load Forecast Report, Jan 2010

Overcoming challenges

- Need for more energy
- Limited natural resources
- Uncertain policy framework
- Implementation barriers
- No “silver bullet solution”



Efficiency: an overlooked solution



- Quick and affordable
- Predictable results
- Technologies leverage efficient water, fuel use
- Increases renewable energy
- Efficiency improvements increase plant output

Achieving progress...

...a suite of existing technologies & applications to provide results

Turbine upgrades

...1 pt efficiency improvement in US CCGT fleet is equivalent to 800,000 drivers giving up their cars annually

Switch to highly-efficient power generation

...Coal generates 2x CO_2 than natural gas and can be 50% less efficient

Combined heat and power

...Expanding CHP deployment to 20% nationally reduces CO_2 848 million metric tons per year

Wind repowering

...Replace first generation wind turbines with multi-MW wind turbines, more power per area of land

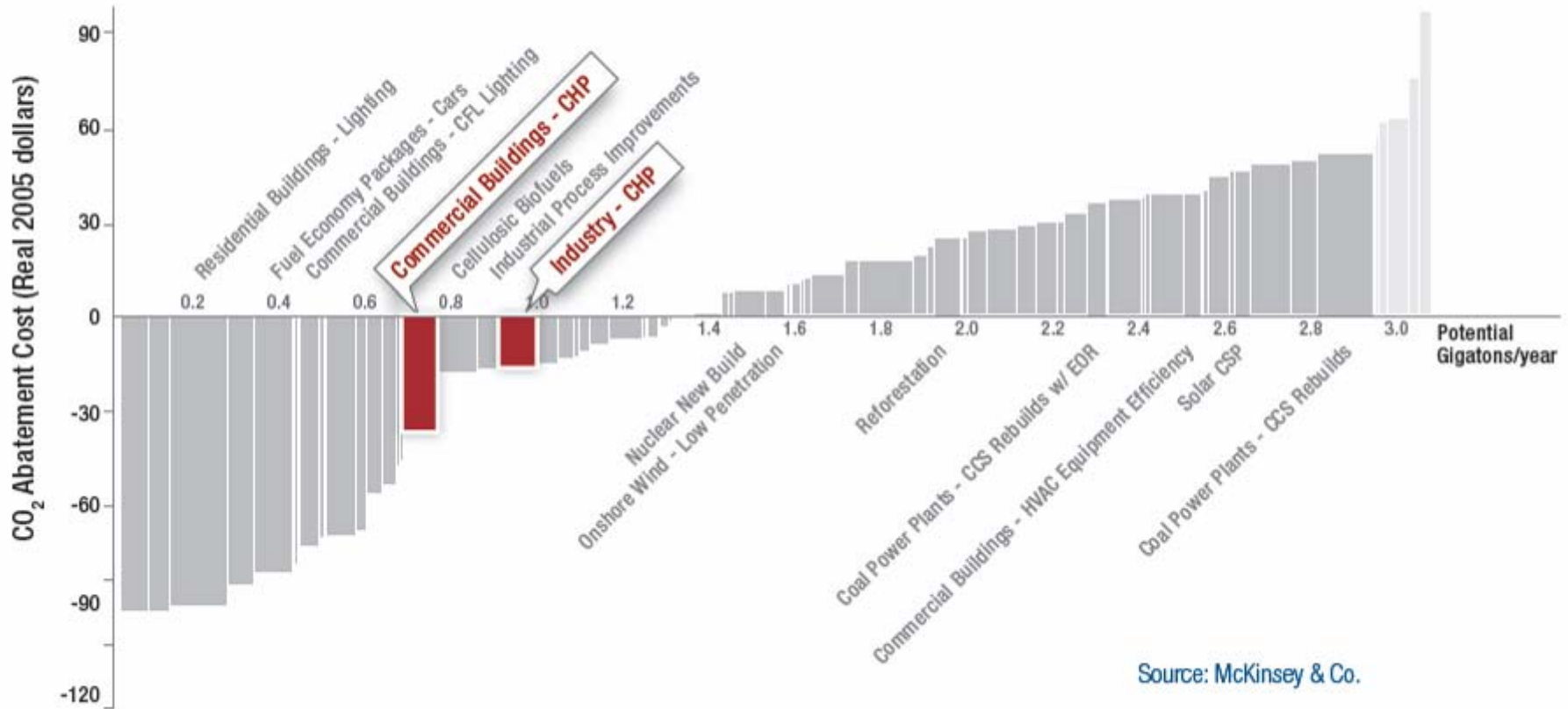
Water reuse and conservation

...1000 MW power plant uses 18m litres of water/day, much not reused



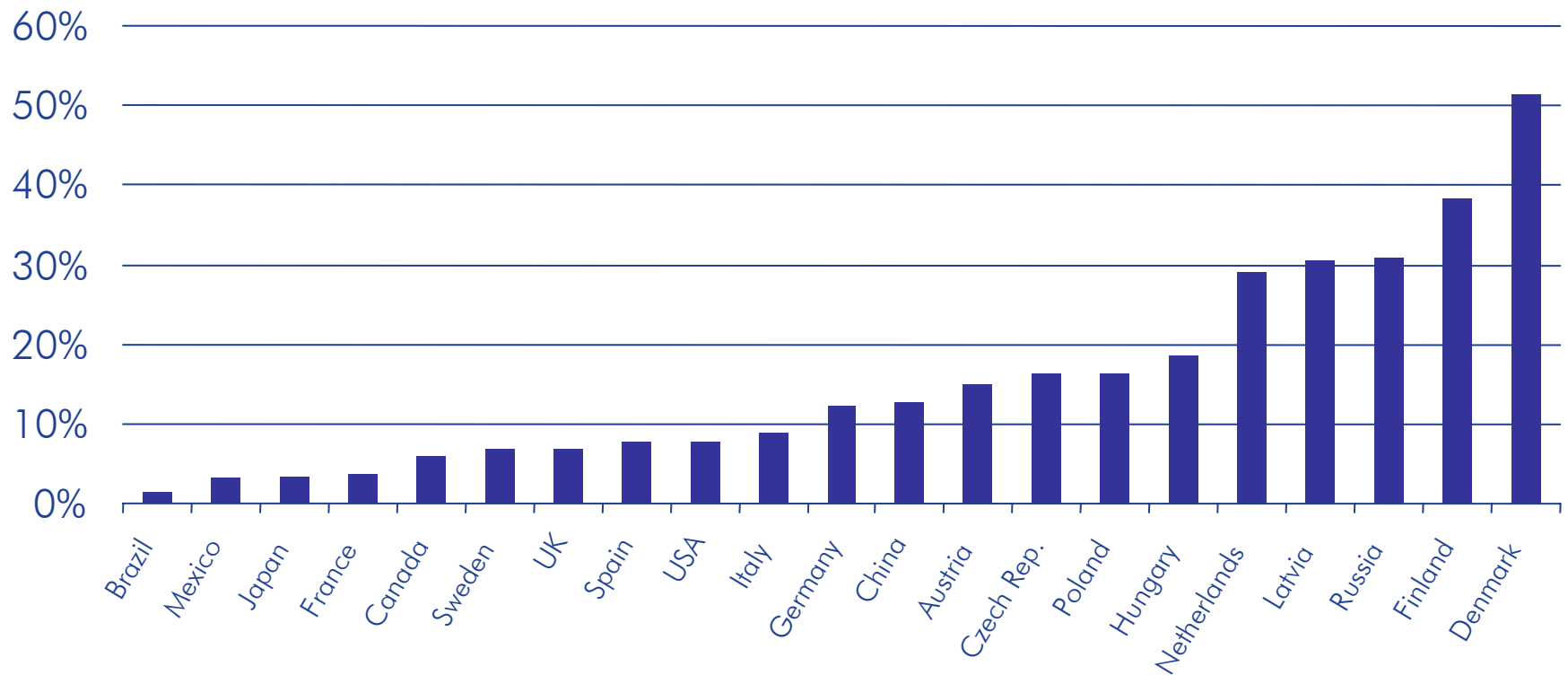
A cost effective means to reduce CO₂

Cost of CO₂ Reduction Technologies



Source: McKinsey & Co.

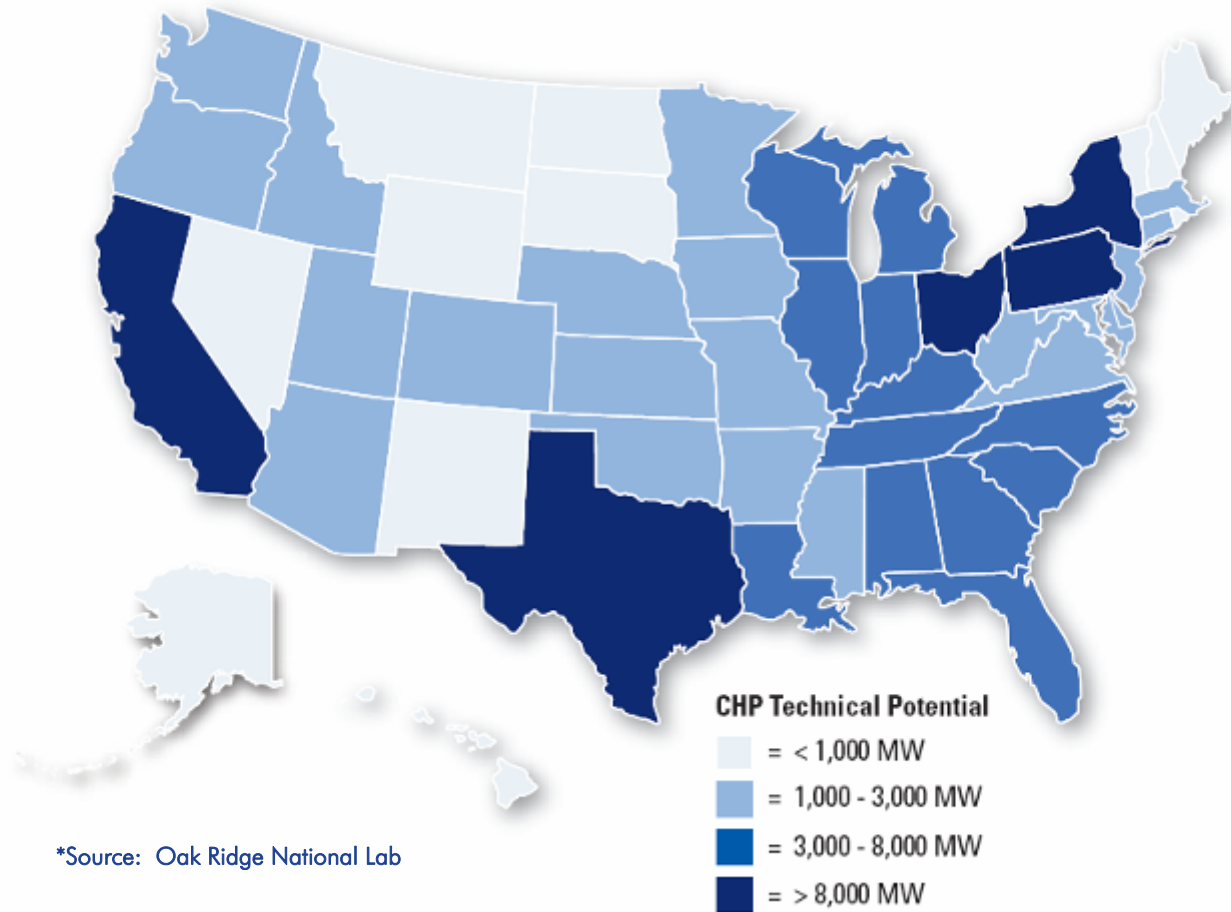
CHP as proportion of national power generation



Source: International Energy Agency

CHP potential in the US

Remaining Technical CHP Potential



*Source: Oak Ridge National Lab

CHP in Virginia

Technical potential = 3290 MW ...

Full deployment results in...

- 84 trillion Btu/year energy saved
- 12 million metric tons/year CO₂ reduced
- \$6.2 billion investment mobilized
- ~25,000 jobs created

Source: ICF International

CHP policy best practices



Financial and fiscal support

Up-front investment (ITC, grants)

Operational support (Feed-in tariffs, PTC)

Utility supply obligations

Energy portfolio standards (RPS, EERS)

Local infrastructure and heat planning

Link demand & supply options

Building regulations

Emissions permitting & trading

Recognize on-site emissions increase while global emissions decrease

Interconnection measures

Net metering

Priority dispatch

Capacity building and outreach

Outreach & education

R&D