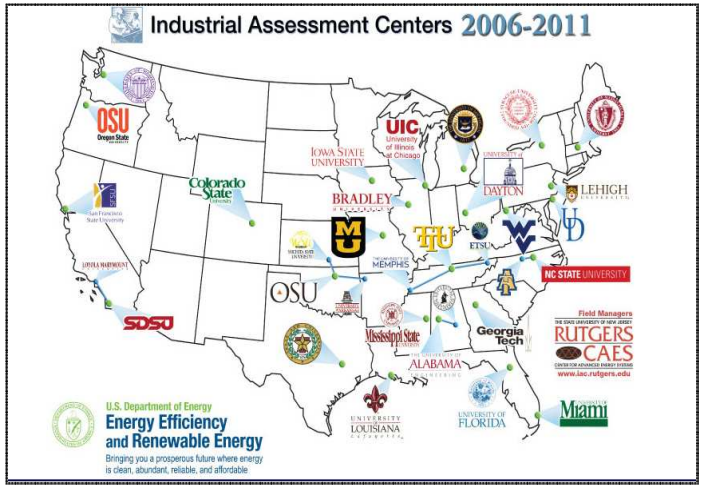
Energy Efficiency – the Big Picture

A Presentation to the IAC Forum

February 3, 2011

Brian Castelli
Executive Vice President



ALLIANCE TO SAVE ENERGY

Creating an Energy-Efficient World

What is the Alliance to Save Energy?

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Creating an Energy-Efficient World

Mission:

- To promote energy efficiency worldwide to achieve a healthier economy, a cleaner environment, and greater energy security.

Organization:

- Not-for-Profit
- Staffed by 80+ professionals
- 34 years of experience
- $15 million annual budget
- Recognized as the premier energy efficiency organization in the world

Honorary Chair, Vice-Chairs & Industry Co-Chair

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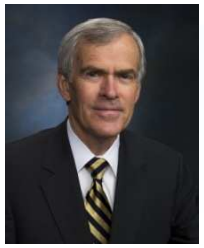
Peter Darbee
Chairman,
President & CEO
PG&E Corporation

Sen. Mark Warner (D-Va.)

Sen. Mark Udall (D-Colo.)

Rep. Paul Tonko (D-N.Y.)

Sen. Lisa Murkowski (R-Alaska)



Sen. Jeff Bingaman (D-N.M.)

Rep. Michael Burgess (R-Texas)

Rep. Ralph Hall (R-Texas)

Rep. Edward Markey (D-Mass.)

Sen. Susan Collins (R-Maine)

Sen. Mark Pryor (D-Ark.)

Sen. Richard Lugar (R-Ind.)

Rep. Steve Israel (D-N.Y.)

Working with and Across All Sectors of the Economy

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- 170 companies, organizations, and institutions in Associates Program
- Associates Program membership represents all economic sectors
- Initiatives underway in research, policy advocacy, education, technology deployment, market transformation and communications

U.S. Green Building Council
Sempra Energy
Schneider Electric
3M
at&t
Dow
Whirlpool Corporation
APPA
Washington Gas
WAL★MART
berkshire gas
United Technologies
Danfoss
Johnson Controls
Tyco Electronics
Andersen Corporation
AW
BEST BUY
Honeywell
PG&E Corporation
Exelon
american lighting association
AREVA
American Chemistry Council
AGA American Gas Association
SIEMENS
DELL
JM Johns Manville

Energy Efficiency – the Greatest Energy Resource

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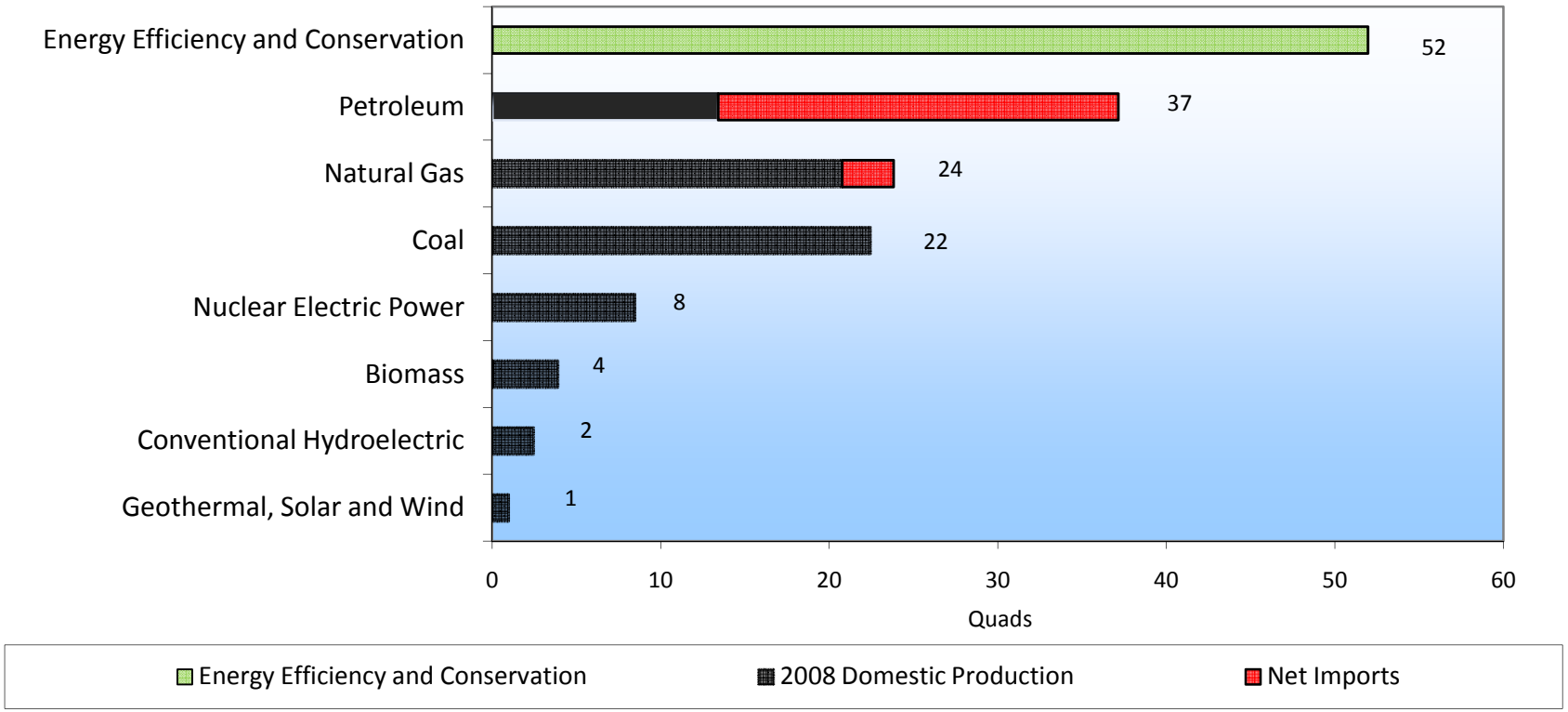
America's Greatest Energy Resource
Energy Efficiency and Conservation Improvements Since 1973
Have Reduced Annual Energy Consumption by 52 Quads in 2008



Alliance to Save Energy, June 2009

Why Energy Efficiency? It's the Gift That Keeps on Giving

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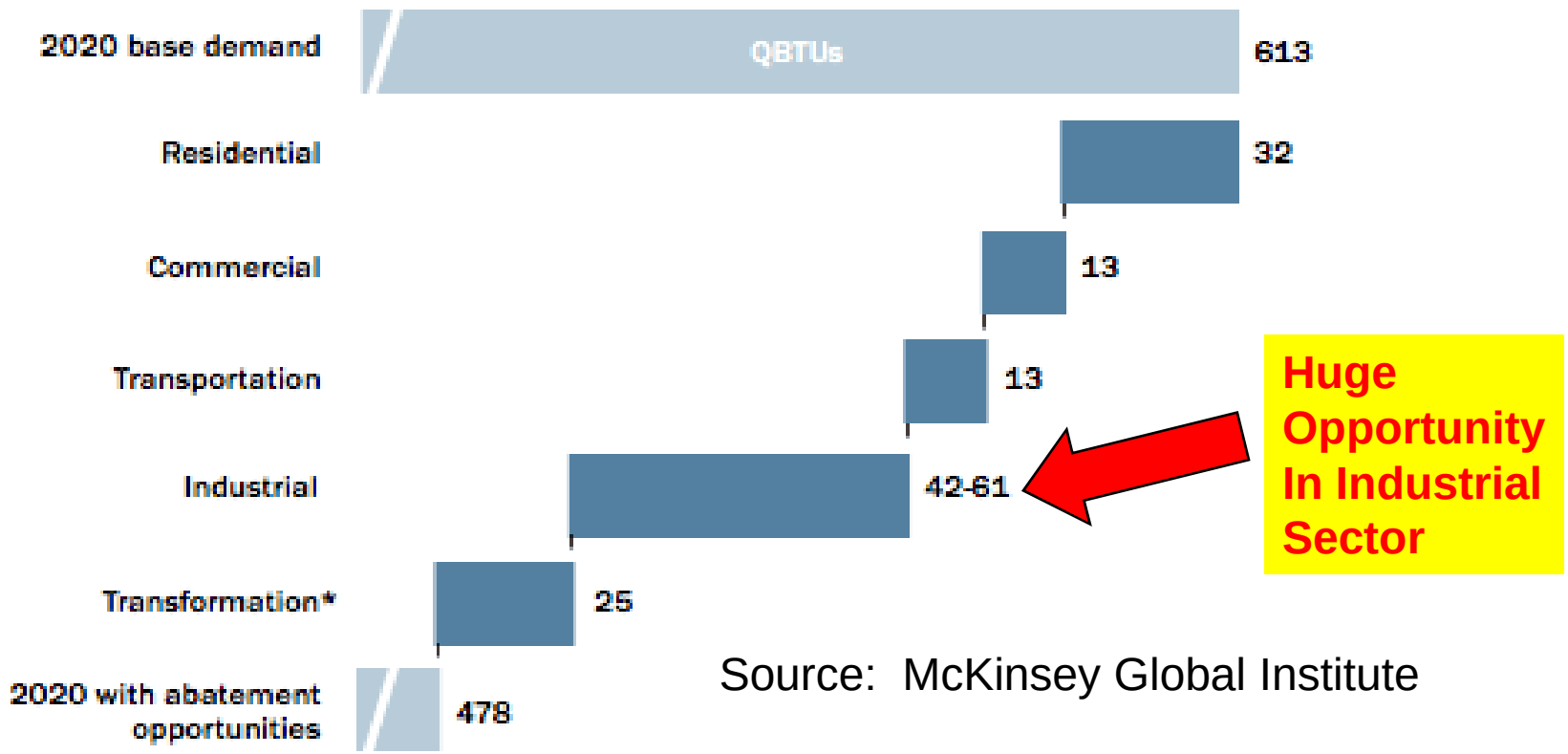
LARGE OPPORTUNITIES FOR IMPROVING ENERGY PRODUCTIVITY ARE AVAILABLE

Potential demand reduction in 2020 through enhanced energy productivity

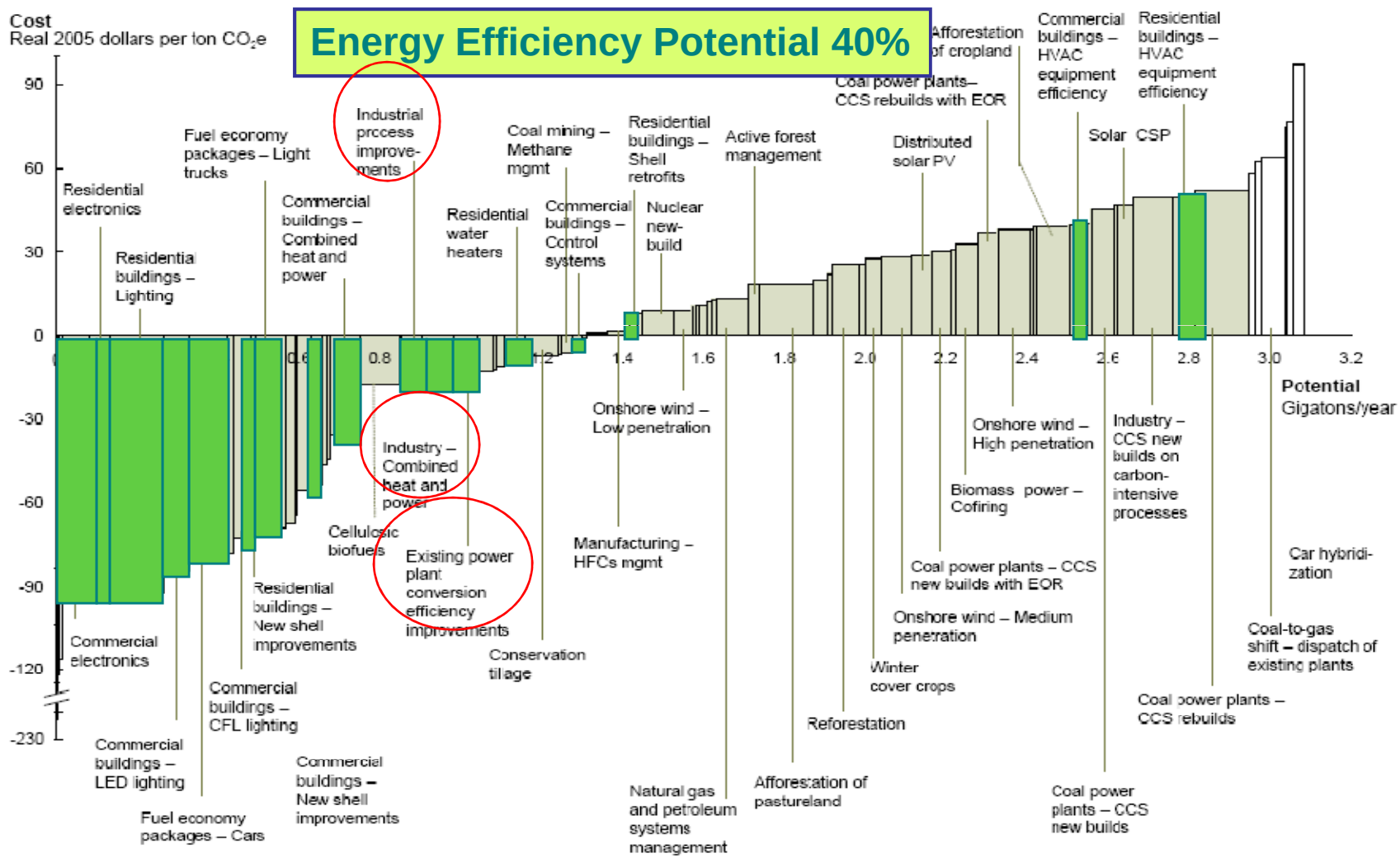


Source: McKinsey Global Institute

Huge EE Potential Remains

Exhibit B

U.S. MID-RANGE ABATEMENT CURVE – 2030

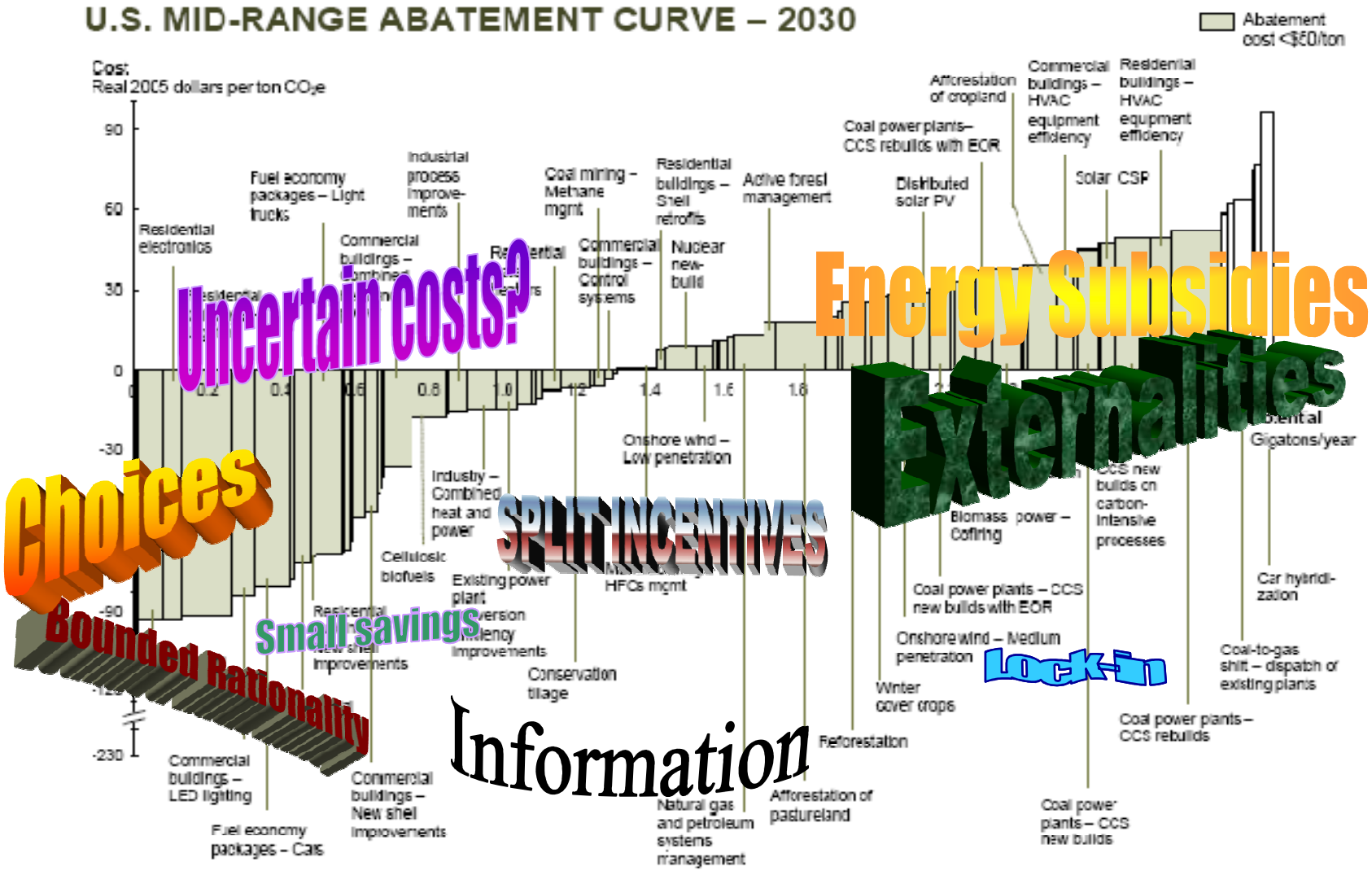


Adapted from McKinsey Analysis

Many Barriers

Exhibit B

U.S. MID-RANGE ABATEMENT CURVE – 2030



Source: McKinsey analysis

Slide 8

A1 ASE, 4/7/2008

Energy Efficiency in Practice

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- Energy efficiency as a resource
  - Energy Efficiency Resource Standards
  - ‘White tags’
  - Carbon market offsets
  - Efficiency projects substituting for generation in electricity forward capacity markets

Energy Efficiency in Practice

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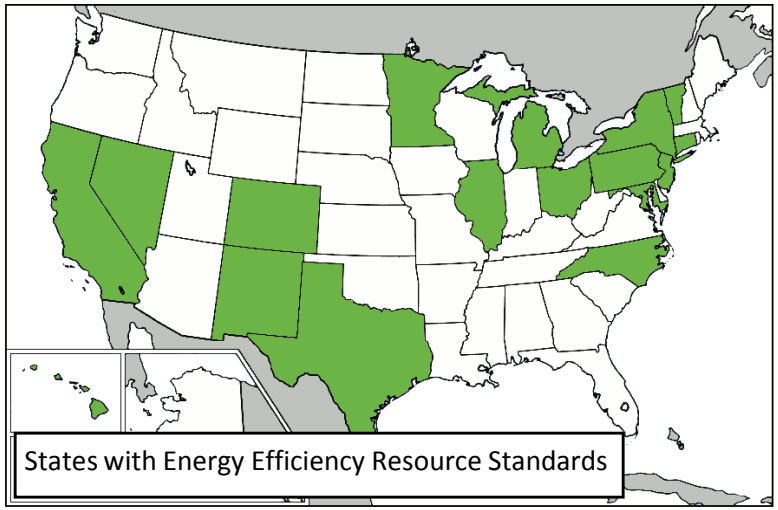
- Energy Efficiency Resource Standards (EERS)
  - Efficiency counterpart to renewable portfolio standards
  - Require a certain percentage of a utility's load to be met with efficiency measures
  - Implemented by several US states. Federal program has been proposed alongside renewable standards.



Energy Efficiency in Practice

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- Energy Efficiency Resource Standards (EERS)
  - In some EERS programs, efficiency credits are tradable, making efficiency itself a tradable commodity

Energy Efficiency in Practice

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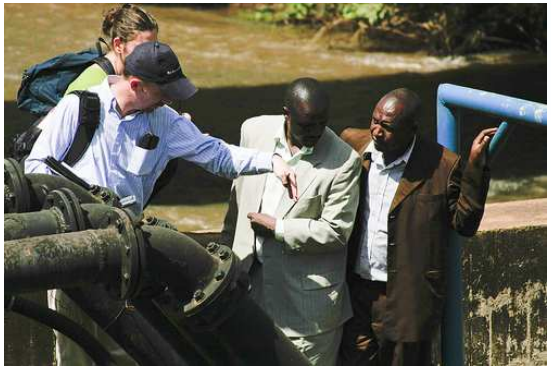
- Efficiency in forward capacity markets
  - When electricity distribution networks hold auctions for generators to bid for contracts, some distribution networks now allow entities to propose efficiency programs to meet projected load
  - The Federal Energy Regulatory Commission recently required that the PJM interconnection (serving much of the mid-Atlantic coast region and some of the mid-west region) allow providers of efficiency programs to bid in their forward capacity market

"Watergy:" A Proven Strategy

- Since 1997: has helped more than 100 cities in 16 countries
- Kicked off in the U.S. in 2010 (Bucks County, PA)
- What does a Watergy Program involve?
  - Improving Motor System Efficiency (pumps, blowers, grinders):
  - System Automation
  - Leak Management
  - Metering and Monitoring
  - Incorporating Energy Efficiency at the Design Stage

WATERGY AROUND THE WORLD

EE in Caribbean Water Utilities



Lake Victoria Watergy project

Watergy in South African schools

Case Study: Emfuleni, South Africa

PROBLEM: **80%** of water flowing to homes **lost** through leaking plumbing fixtures!

TECHNICAL SOLUTION: Pressure Management

- Automated pressure management valves on each supply line
- Reduced high bulk pressure; further reductions @ night
- $800,000 construction commissioned Sept 2005

FINANCING SOLUTION: Performance Contracting

- Water pressure management firm acting as ESCO
- Build-Operate-Train-Transfer to municipality after 5 years
- Fees: firm gets 20% of savings

Swimming Pool

Emfuleni Results

- **Payback** period: <3 months
- Annual Savings:

  Money: US $ 3.8 million

  Water: 2.1 billion gallons
  a reduction of **>30%**

  Energy: >14 million kWh
- **CO2** Reductions:

  12,000 tons/year

A Look at Success:

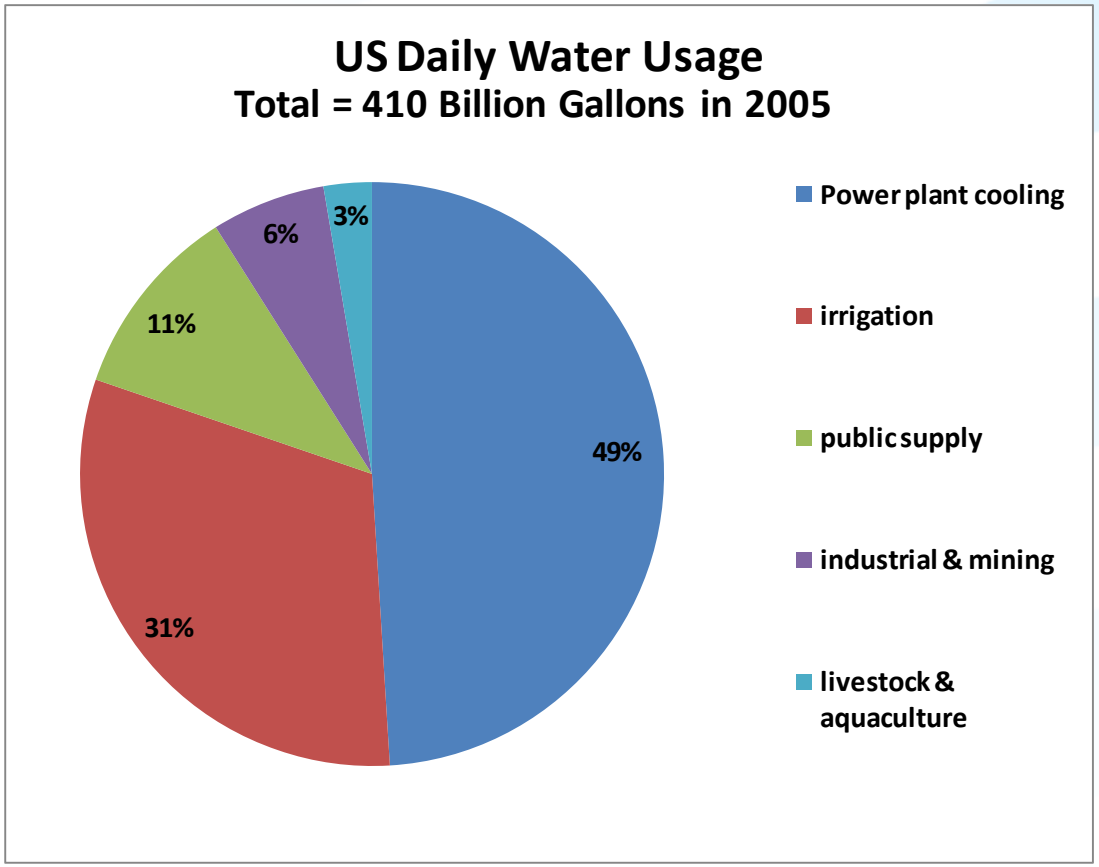
WHY IS THIS IMPORTANT?

- ✓ Every liter of water that passes through a system has a significant **energy cost**.
- ✓ Water sector efficiency leaves more funds for crucial and often underfunded **public services**.
- ✓ In most developing countries, **1/3 to 1/2 of water produced is lost.**

AND IT'S COST EFFECTIVE…

- ✓ Rapid **Payback**: generally from a few months to 3 years
- ✓ Huge **Savings**: at least 20% in energy costs; much higher possible
- ✓ Makes the most of existing **infrastructure**; reduces the need for new supplies

Water Use in the U.S.



*85% fresh water/15% saline; 2-3% evaporates

WHY WATERGY in the U.S.?

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WHY IS THIS IMPORTANT?

- ✓ 3% of U.S. energy consumption goes to deliver potable/waste water services
  - = $4 billion in energy costs
  - = 45 Million tons of GHGs

AND IT'S COST EFFECTIVE…

- ✓ Rapid Payback: generally from a few months to 3 years
- ✓ Huge Savings: at least 20% in energy costs
- ✓ EPA estimates 10% reduction in energy use would save $400 million annually

watergy
WATER & ENERGY EFFICIENCY

1st Domestic Project: Bucks County, Pennsylvania

Bucks County Water & Sewer Authority

- Created in 1962
- Serves 78,000 retail water and sewer customers
- Total population served is 385,000
- Has grown by 300% in past 15 years through acquisitions
- Annual energy use ~20 million kWh
- Scope of Watergy assessment:
  - 4 wastewater treatment plants (treat more than 2 MGD)
  - 3 pumping stations (average total flow ~25 MGD)

1st Domestic Project: Bucks County, Pennsylvania

Assessment Team

- Cross-functional – management, operations & energy experts
- Takes a systems approach
- Strong knowledge of energy management

1st Domestic Project: Bucks County, Pennsylvania

Assessment Conclusions

- More data collection helpful
- Energy efficient motors, VFDs and controls already installed
- Energy management strategy can optimize existing infrastructure

ASE's Industrial Activities

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- Past
  - Support EERE Steam Challenge/BestPractices
    - Training development & delivery; newsletter; Steering Committee
  - Developing technical resources
  - Industrial Partnerships
- Present
  - Outreach & Analysis for Save Energy Now LEADER and ALLY initiatives
  - Analyses of industrial energy efficiency best practices and emerging technologies
  - Support for Superior Energy Performance & ISO 500001

ASE's Industrial Activities – 2011 & Beyond

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- Expanded outreach and analysis for ITP
- Additional analyses and support of ISO 50001
- Explore international industrial EE partnership
- Analysis of federal collaboration for small/medium enterprises
- Develop an Industrial Energy Efficiency Coalition (CEEM)
- Our Growth = increased staffing needs
  - IAC students welcomed!!
  - Contact Bruce Lung at rlung@ase.org

How do we know we achieved Energy Efficiency?

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- Evaluation, Measurement, & Verification
  - 'EM&V' – how to measure the additionality of efficiency programs?
  - With programs promising or claiming quantifiable energy savings, we must develop metrics to measure success

- EM&V <u>challenge</u> is how to estimate energy not consumed that would have been otherwise—the counterfactual.

How do we know we achieved Energy Efficiency?

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- Evaluation, Measurement, & Verification
  - Several US states have developed their own protocols, but they vary
  - For instance, the “simple” lightbulb swap
    - The same CFL bulb gets credited with different savings depending on what state it’s in, based on different states’ assumptions
    - Similar issue across EU

Huge differences in the simplest assumptions for the simplest EE measure

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15W CFL installed in a living room, with a rated lifetime of 10,000 hours

	CT	PA	VT	CA	Energy Star	CO	WI (ACES Deemed Savings Review, June 2008)	MA (draft as of 10/09)
How equivalent incandescent wattage is calculated	3.4 x CFL wattage	Measured	CFL W + 48.7	3.53 x CFL wattage	4 x CFL wattage	Assumption that 13-16W CFLs replace 60W incandescent	CFL W + 51.9	3.4 x CFL wattage
Change in Wattage	36	varies depending on individual measures	48.7	37.95	45	45	51.9	36
Hours/day	2.96	3	3.4	2.18	3	2.37	2.3	2.96
Life in years	5.25	6.4	6.4	6.6	9.13	7	Not given	6
Life in Hours	5672.1	7008	7942.4	5251.62	9997.35	6048	Not given	6482.4

EM&V – Where is it Going?

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- Part of a trend toward regional and national protocols and standards
  - Growing scope of EERS and EE in RES.
  - Potential trading of ESCs directly or as components of RES or as carbon credits and offsets.
  - Northeast Energy Efficiency Partnership (NEEP)—investigating regional protocol development.
  - North American Energy Standards Board (NAESB)—tech standards
  - National Action Plan for Energy Efficiency (NAPEE)—evaluating if it has a role in protocol development

The American EE Policy and Political Perspective

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- Energy efficiency is becoming increasingly visible in national policy-making
  - Energy Policy Act of 2005 (EPAct '05)
  - Energy Independence and Security Act of 2007 (EISA)
  - Stimulus (February 2009)
- What's Next for Energy & Climate in Congress?

What to expect in the 112th?

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- 6-8 month window for serious legislating before 2012 election cycle kicks in;
- Prospects for a bi-partisan "ACELA 2" bill in Senate ENR;
- Elements may include building codes, appliance standards, building labeling, EE financing (Green Bank);
- Clean Energy Standard?
- Climate Legislation going nowhere
- Vote on EPA regulation of GHG?;
- Oversight in the House;
- CR expires March 4, 2011.

President Obama's State of the Union and Energy Efficiency

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- GOAL: generating 80 percent of the Nation's electricity from clean energy sources by 2035;
- GOAL: doubling energy efficiency investment at the Department of Energy;
- CREATE: a new Clean Energy Standard to be paired with energy efficiency programs that will lower consumers' energy bills;
  - such as stronger appliance efficiency standards,
  - tax credits for energy efficiency upgrades, and
  - the proposed Home Star program.
- INCREASE: focus & importance of state EE policies.
- HELP: manufacturers invest in technologies to improve efficiency and reduce energy costs.

President Obama's State of the Union and Energy Efficiency

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Intent is to Revitalize Manufacturing – 3 Main Initiatives

- More funding to NSF, NIST & DARPA for research into advanced manufacturing technologies
  - Highlights include nano-technologies, nano- & bio-manufacturing, robotics, smart buildings, production innovations like "Adaptive Vehicle Make," R&D into flexible electronics and bio-synthesis, and a Wireless Innovation Fund to develop wireless technologies in manufacturing.
- Re-authorizing the 48C Clean Energy Manufacturing Tax Credit ($5 billion)
- Partnering with Industry to identify Advanced Technologies that can Improve Manufacturing
  - Advanced Manufacturing Technology Consortia ($12 million)
  - Technology Innovation program ($75 million)

Policies and Investment Make a Difference!

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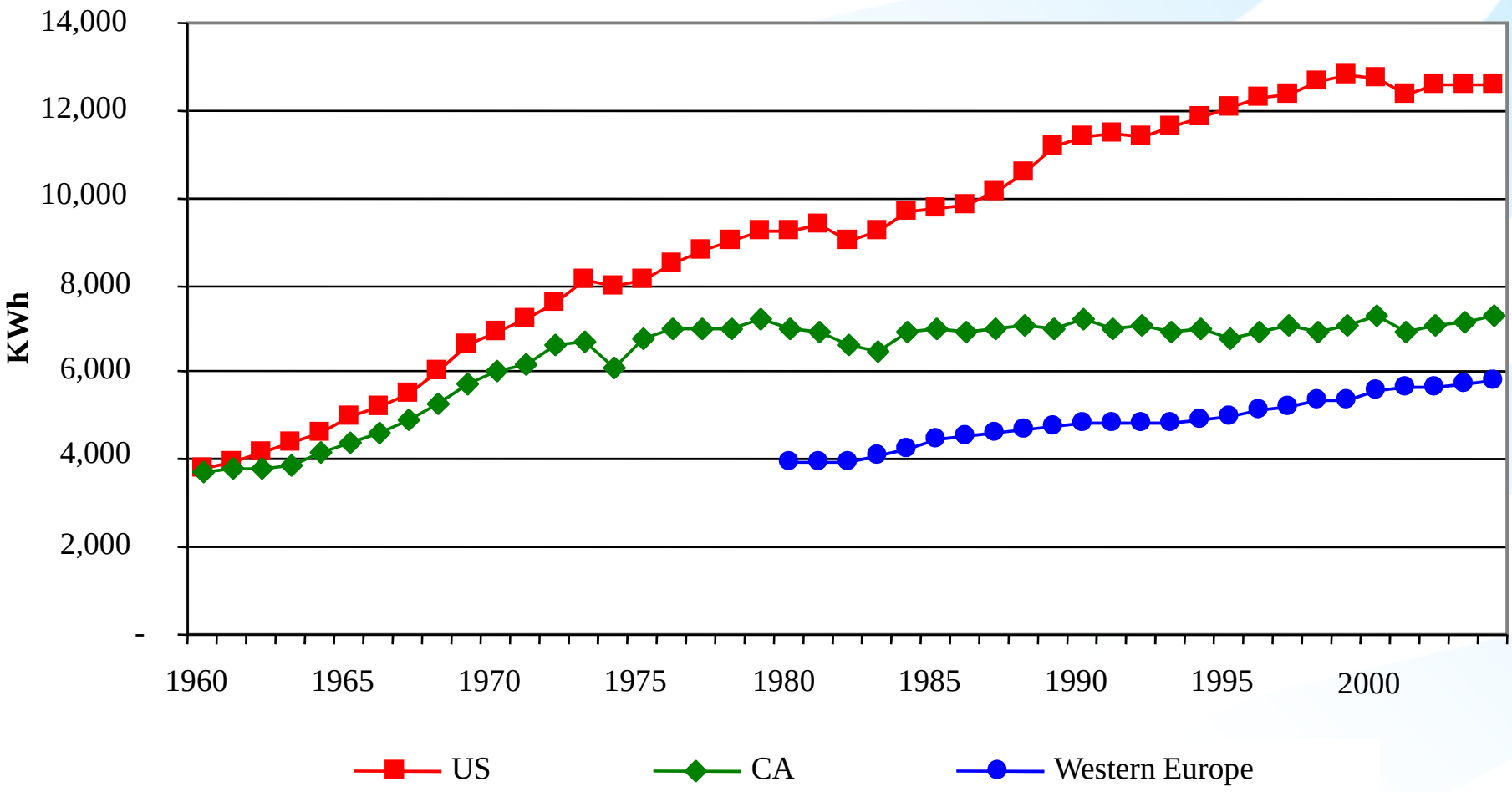

Why is all this important?
We only have one World…

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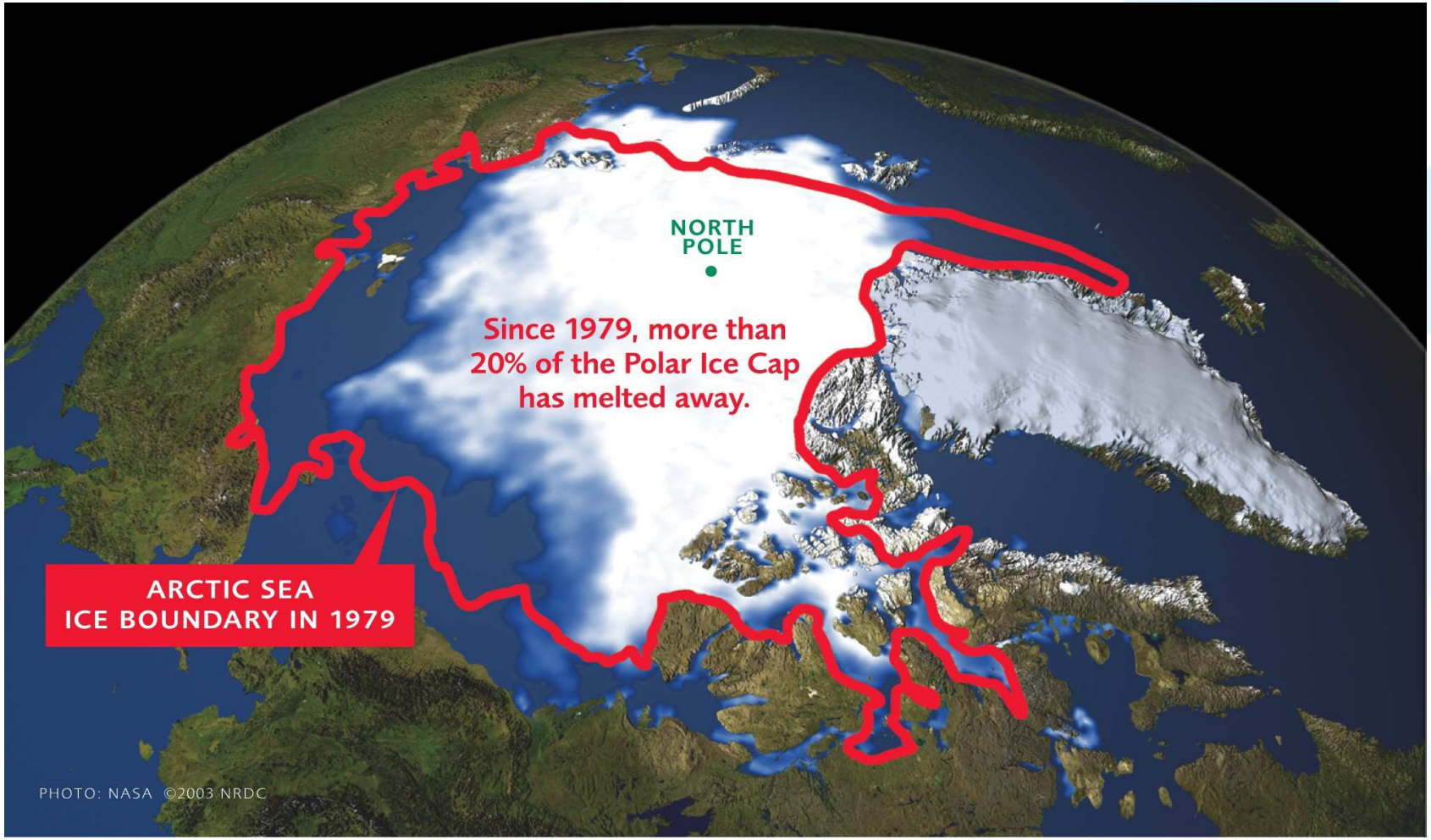

Thank you!

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For More Information….

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