Institute for Industrial Productivity – Addressing Energy Efficiency in the U.S.

Technology Forum: Sustaining Industrial Energy Efficiency in a Potentially Water-Short Future June 19, 2013 – Brady's Landing, Houston

Jim Quinn



Sharing best practices for the low carbon future

### **World Energy Use**

#### **Global Industrial Energy Consumption**



(Excludes energy conversion losses and petroleum feedstocks)

Source: International Energy Agency, Online Database (Energy Balances of OECD and Non-OECD Countries)

### U.S. Energy Use per Unit of GDP, 1970–2010



Institute for Industrial Productivity

Source: ACEEE analysis of data in EIA 2012a [AER] and BEA 2012

### **Trends in Industrial Energy Intensity**

#### U.S. Chemicals Industry: Energy Intensity



2012 Guide to the Business of Chemistry, Table 10.5: Fuel and Power Energy Consumed per Unit of Output (index where 1974=100).

#### U.S. Iron and Steel Industry: Energy Intensity



#### **U.S. Cement Industry: Energy Intensity**

M BTU/Ton





Source: World Business Council for Sustainable Development (WBCSD). See http://wbcsdcement.org/GNR-2010/United%20States/GNR-Indicator\_329-United%20States.html

### **Shale Gas Revolution**



Source: Energy Information Administration (EIA) Annual Energy Outlook 2013



# Gas availability and prices likely to be key driver for industrial decisionmaking

Henry Hub natural gas prices are projected to average between \$4 and \$6 per MMBtu throughout much of the projection.

Investments in new industrial facilities as well as retrofits likely to focus on natural gas as major supply source Gas Prices at Henry Hub (2010\$/MMBtu)



Source: ICF Estimates, 2013



## **Re-shoring of U.S. Manufacturing**

Rising production of shale gas makes prospect of U.S. manufacturing increasingly attractive:

*The Economist<sup>1</sup>:* 

*"…lower American energy prices could result in 1 [million] more manufacturing jobs…"* 

"Companies such as Dow Chemical...and Vallourec [steel-tube producer]...have announced new investments in America to take advantage of **low gas prices** and to supply extraction equipment."



The U.S. Government is tracking over \$80 billion in planned manufacturing investments (fertilizer, chemicals, steel, assembly)



### **Resource Constraints**

Demand for most resources has grown strongly since 2000, a trend likely to continue to 2030.



<sup>1</sup> Only cereals.

SOURCE: Global Insight; IEA; UN Environment Program (UNEP); FAO; World Steel Association; McKinsey analysis

### IIP at a glance....

### **Our Mission**

To improve industrial energy efficiency and productivity by providing industry and government decision makers with best practices to implement effective policies, technologies, and financial approaches.

#### Who We Are

- A non-profit established by the ClimateWorks Foundation in 2010
- Strategically linked to a global network of groups addressing climate change
- Work in partnership with industries, governments, financial institutions, and other stakeholders
- Offices in Washington DC, Paris, New Delhi and Beijing





#### **IIP's Strategic Focus**





### **U.S. Program Focus**

- Develop consortium for managing/updating industrial energy efficiency decision tools
- Partner with gas and electric utilities to promote recognition of Energy Management System programs as valid energy efficiency measures under utility requirements
- Promote combined heat and power and efficient natural gas technologies in existing and new industrial facilities



### **Software Decision Tools for Energy Systems**



Prepared for the Advanced Manufacturing Office (AMO) by Energetics Incorporated

### **Energy Management Systems**

#### ACT PLAN MANAGERIAL TECHNICAL PLAN: PLAN: Policy/goals/targets Energy data Resources management Assessments DO: Training Communication Energy purchasing Control equipment Design Projects systems & processes Verification CHECK: Corrective/ CHECK: Monitoring preventive action CHECK DO Internal audits Measurement ACT: ACT: Management System review performance



DO:

### CHP - Technical Potential of 130,000 MW







### **IIP's Best Practice Databases**



#### Industrial Efficiency Technology Database

#### www.ietd.iipnetwork.org

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#### Industrial Efficiency Finance Database www.iipnetwork.org/databases/finance



#### Industrial Efficiency Policy Database www.iepd.iipnetwork.org



#### Supply Chain Initiatives Database www.iipnetwork.org/databases/ supply-chain`

### The Energy-Water Nexus

### in Chemical Manufacturing and Refining

Current Practice: 67 to 92% of water used is for process cooling or steam systems (TxIOF 2013)

Future: What happens if there is a decrease in water available for energy systems?

Resulting in increase in energy use

- Substitute chillers for cooling water
- Substitute other cooling systems for cooling towers

#### Impacts on production

Decreased production due to less efficient product recovery (not operating at optimum temperature) or

Change processes to avoid energy/production penalty



# **Thank You!**

