



ANS

Nuclear Energy

A Business Driver For The Next Generation

Donald R. Hoffman

President & CEO, Excel Services Corporation

Immediate Past President, American Nuclear Society

World Nuclear Exhibit

October 14-16, 2014

Paris, France



SERVICES CORPORATION
NUCLEAR ENGINEERING CONSULTING

About ANS



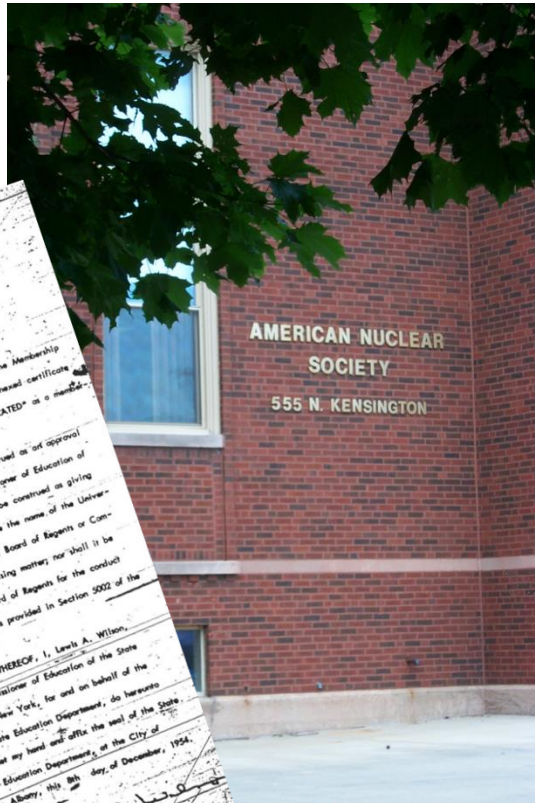
ANS is a professional organization of engineers, scientists, and other professionals devoted to the peaceful applications of nuclear science and technology



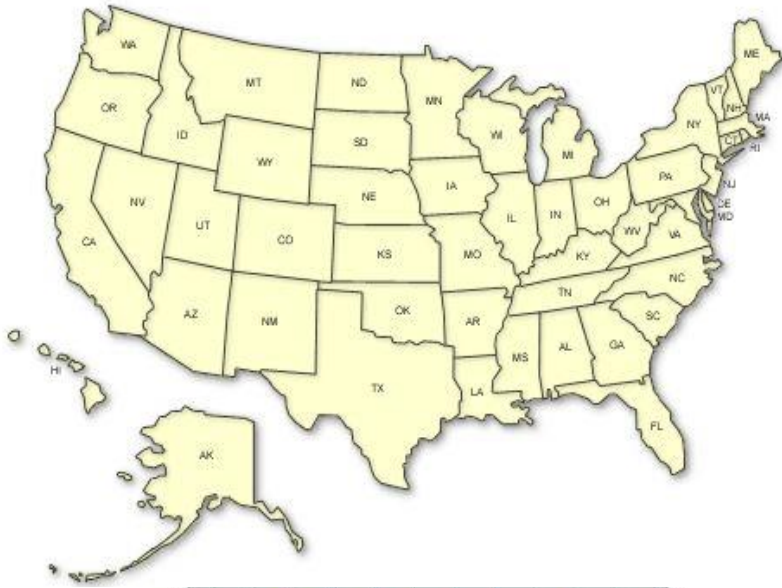
About ANS



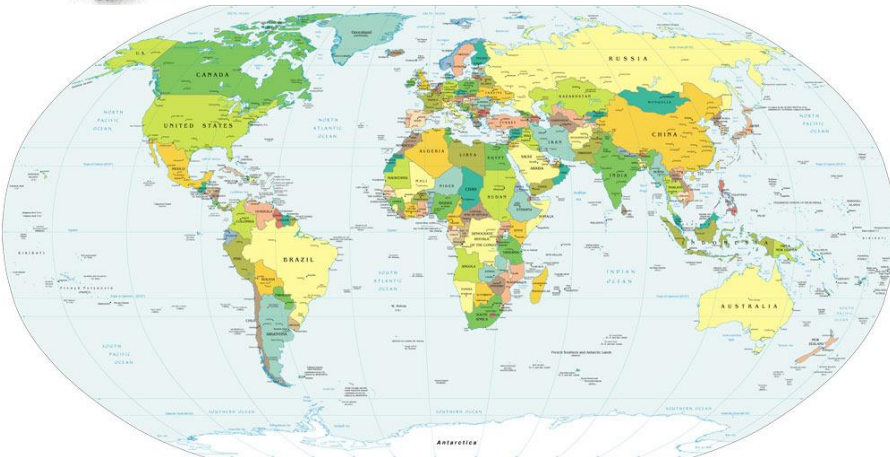
- Founded in December 1954
- Created a forum for knowledge sharing
- Convened countless conferences
- Stimulated discussion and debate among professionals
- Fostered interest in the profession
- Provided recognition for excellence
- Influenced the conversation about nuclear with those outside the field



ANS Vital Statistics



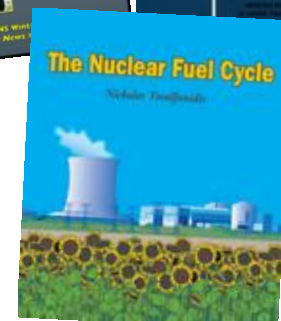
- More than 11,000 individual members
- Nearly 100 organizational members
- International alliances, bilateral agreements with some 30 nuclear societies outside the U.S.
- Over 60 local sections (including 9 outside the U.S.)
- 20 specialty professional divisions and technical groups including the Young Members Group
- More than 30 local student sections



ANS's Unique Role



- Research
 - Professional divisions and technical groups
- Student and early career support
 - Scholarships, mentoring, leadership development
- Standards
 - Improving plant operations
- Education and professional development
 - Learning and sharing information, networking, leadership opportunities
- Public outreach and ANS's Center
 - Community awareness, K12 education, policy maker resource, media engagement
- Unique voice representing the nuclear science community
 - Informing media, opinion leaders, and policy makers



ANS's Unique Role



- Hosts numerous national and international technical conferences
- Publishes highly regarded magazines, journals, resource books, textbooks
- Hosts social interactions for members online and offline
- Sponsors local activities and meetings
- Offers professional development programs
- Prepares members for professional certification exam
- Offers opportunities for leadership in the Society



Rising to the Global Challenge **ANS**

I and the American Nuclear Society through its position statements and interactions with policy makers is committed to:

- Treat our existing reactor fleet as a national asset
- Working with our National Governors Associations (NGA) and all Governors to address Nuclear role in states Energy Policy
- Encourage DOD to be an eager lead customer of SM
- Be timely and flexible negotiating 123 agreements
- Improve the 810 process
- Be aggressive with export financing
- Invest in human infrastructure
- Develop a sensible waste policy



Snapshot of Energy in the US



ANS

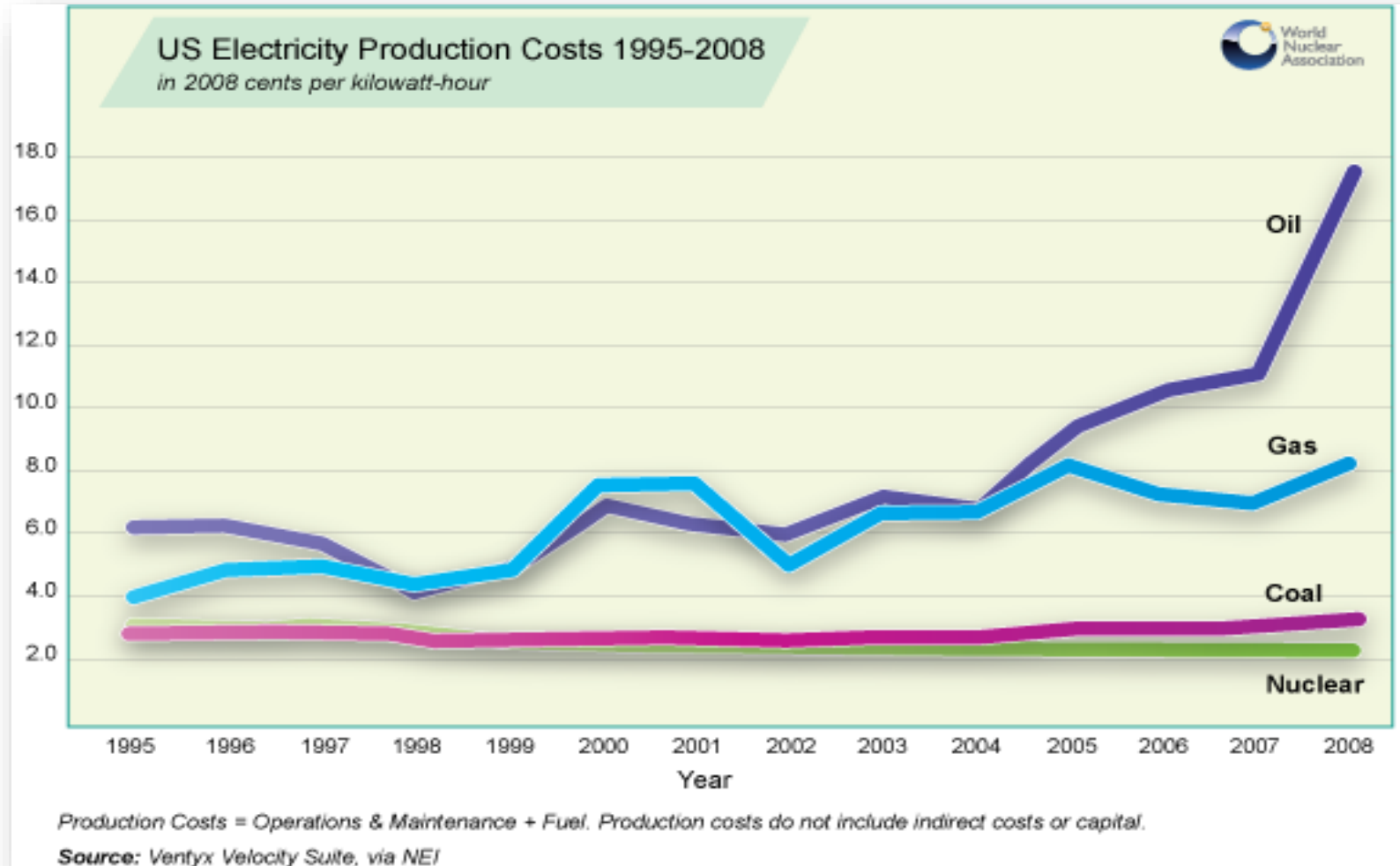
- In 2012, the United States generated about 4,054 billion kilowatthours of electricity. About 68% of the electricity generated was from fossil fuel (coal, natural gas, and petroleum), and of the fossil fuel generation 37% from coal.
- Energy sources and percent share of total electricity generation in 2012 were:
 - Coal 37%
 - Natural Gas 30%
 - Nuclear 19%
 - Hydropower 7%
 - Other Renewable 5%
 - Biomass 1.42%
 - Geothermal 0.41%
 - Solar 0.11%
 - Wind 3.46%
 - Petroleum 1%
 - Other Gases < 1%



Cost of Electricity



ANS

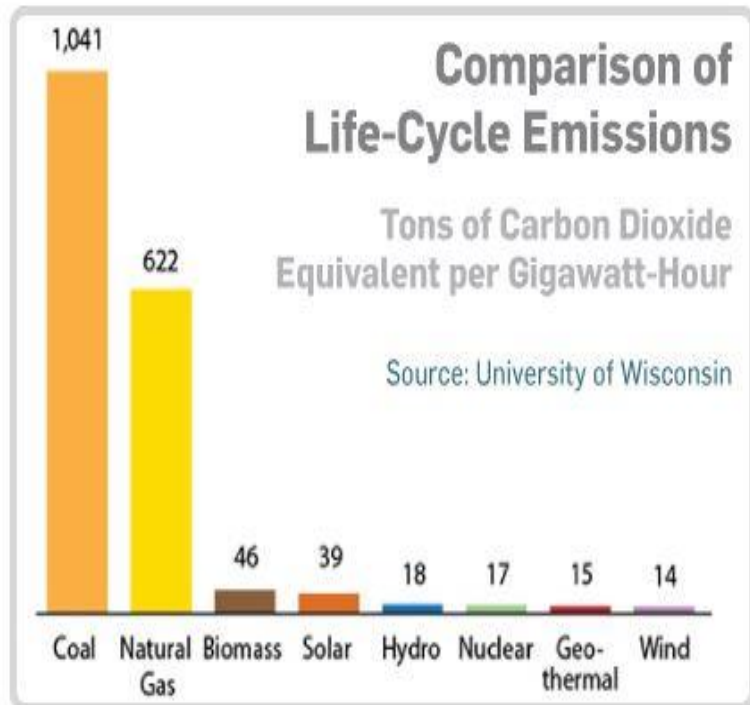


Emissions



Nuclear operates day and night in all weather while emitting no carbon dioxide, sulfur dioxide or nitrogen oxide

Emission-free aspect of nuclear generation likely to become increasingly important



Emissions



Nuclear Plants produce nearly a fifth of the United States' total power production, but in 2013 accounted for an overwhelming 63 percent of the country's carbon-free energy. Nuclear energy also prevented 589 million metric tons of carbon dioxide emissions in 2013, equal to the carbon emissions emitted by 113 million passenger cars – more than all passenger cars in the country.

Where We Are Headed in the US



U.S. electricity demand expected to rise 28 percent by 2040 (*U.S. EIA Annual Energy Outlook 2013*)

The United States will need **hundreds** of new power plants of **all** types to meet this increased demand and replace older facilities

Nuclear energy is the only proven large-scale, emission-free electricity source that can be widely expanded

Cost of Natural Gas



ANS

- Pressures associated with low price and relative abundance of natural gas
- Recent delivery difficulties of natural gas, particularly in the Northeast of the US, caused megawatt hour costs to increase from around \$40 to \$250
- Demand will have an inevitable impact on price
- Additional regulation of fracking may also have price impact



State of Nuclear Power



- Kewaunee and Vermont Yankee
 - Demonstrates impact of low natural gas price
- Crystal River
 - Containment issues as well costs and uncertainties of repairs, too much risk
- San Onofre
 - Costs and uncertainties of repairs
- Fort Calhoun – regulatory evaluation



State of Nuclear Power



ANS

Nuclear power still continues to be an important source of electricity

- 32 companies are licensed to operate nuclear reactors
- 31 states have operating plants
- In seven of those states, nuclear power produced the largest percentage of those states' electricity
- In 2011 nuclear power plants generated an estimated 789 billion kilowatthours



Overall Performance



- 2012 performance demonstrated safety and reliability
- Average capacity factor was 86.4 percent
 - Best reliability of any source of electrical generation
 - Even notwithstanding contribution to capacity factor of Crystal River 3 and San Onofre 2 and 3 effective all of 2012



Investment



Continued high levels of investment

- 2013 industry invested more than \$8.5 billion (US) in facilities
- Investment maintains highest levels of safety and reliability
- Completes some significant uprates
- Positioned facilities to operate beyond original 40 year licenses to 60 years
- Now evaluating license extensions to 80 years and beyond



Impact of New Construction



ANS

- New construction at Vogtle and Summer underway
- Largest construction projects in their respective states, Georgia and South Carolina
- Directly employing nearly 4,000 workers, on a routine basis and twice that during peak construction
- Support about 35,000 jobs across America



For the Future



ANS

- Have 10 applications for construction and operating licenses under review at the NRC
- Two applications for early site permits under review at NRC
- Unlikely to be any new large build Nuclear Power Plant construction until the next decade, but will be new construction to respond as demand for electricity recovers
- As a result of our impasse on waste disposal, licensing has stalled



Impact on Local Communities



ANS



What about the impact on local communities where nuclear plants are located?

- Each year, the average nuclear facility generates approximately \$470 million (US) in sales of goods and services
- The same average nuclear facility will create nearly \$40 million (US) in total labor income
- Operation of the same average nuclear facility generates 400 to 700 permanent jobs, which pay 36 percent more than average salaries in the local area



Economics



ANS

- Permanent jobs at nuclear plants create equivalent numbers of support jobs locally – grocery stores, restaurants, dry cleaners, car dealers
- Every dollar spent by the average nuclear plant produces \$1.04 in the local community
- Each nuclear plant generates an average of \$16 million (US) in state and local tax revenue for schools, roads and similar infrastructure
- And the federal tax payments of each nuclear unit is roughly \$67 million (US)!



Stability



ANS

- Nuclear generated electricity offers considerable price stability over its coal, natural gas, and renewable energy sources
- Only 28 percent of nuclear production costs are fuel costs, compared to 80-90 percent of fossil fuel production costs are fuel costs
- Uranium is the least price volatile fuel for all our sources of energy, while nuclear energy remains the most green of all



What Can We Do?



ANS

- Nuclear power is beset by challenges, but laden with opportunity
- What can we do?
 - Develop comprehensive energy policy that includes all carbon-free sources, including nuclear
 - Close the nuclear fuel cycle
 - Develop and deploy SMRs
 - Ensure a strong infrastructure for domestic nuclear energy production
 - Support the export of nuclear science and technology

Thank you!

Donald R. Hoffman

Immediate Past President, American Nuclear Society
President and CEO, EXCEL Services Corporation