Smart Gridding to Smart Cruising

Paul Molitor
Senior Industry Director, Smart Grid
NEMA

No, unfortunately…

- 21 Major League Seasons
  - Milwaukee, Toronto, Minnesota
- 7 Time All Star
- 3,319 Hits = 9th All Time
  - 10th in Singles
  - 11th in Doubles
  - 18th in Runs Scored
  - 36th in Stolen Bases
- Hall of Fame Class of 2004

What the NEMA?

- National Electrical Manufacturers Association
- Approximately 450 member companies
  - products used in the generation, transmission and distribution, control, and end-use of electricity
- NEMA provides a forum for
  - development of technical standards
  - advocacy of industry policies on legislative and regulatory matters
  - collection, analysis, and dissemination of industry data
- Organizations NEMA collaborates with
  - DOE, EPA, DOT, DOD, DOC, NIST, FERC, Congress

ANSI-NEMA 5-15R Wall Outlet and 5-15P Plug Type

What is the Smart Grid?

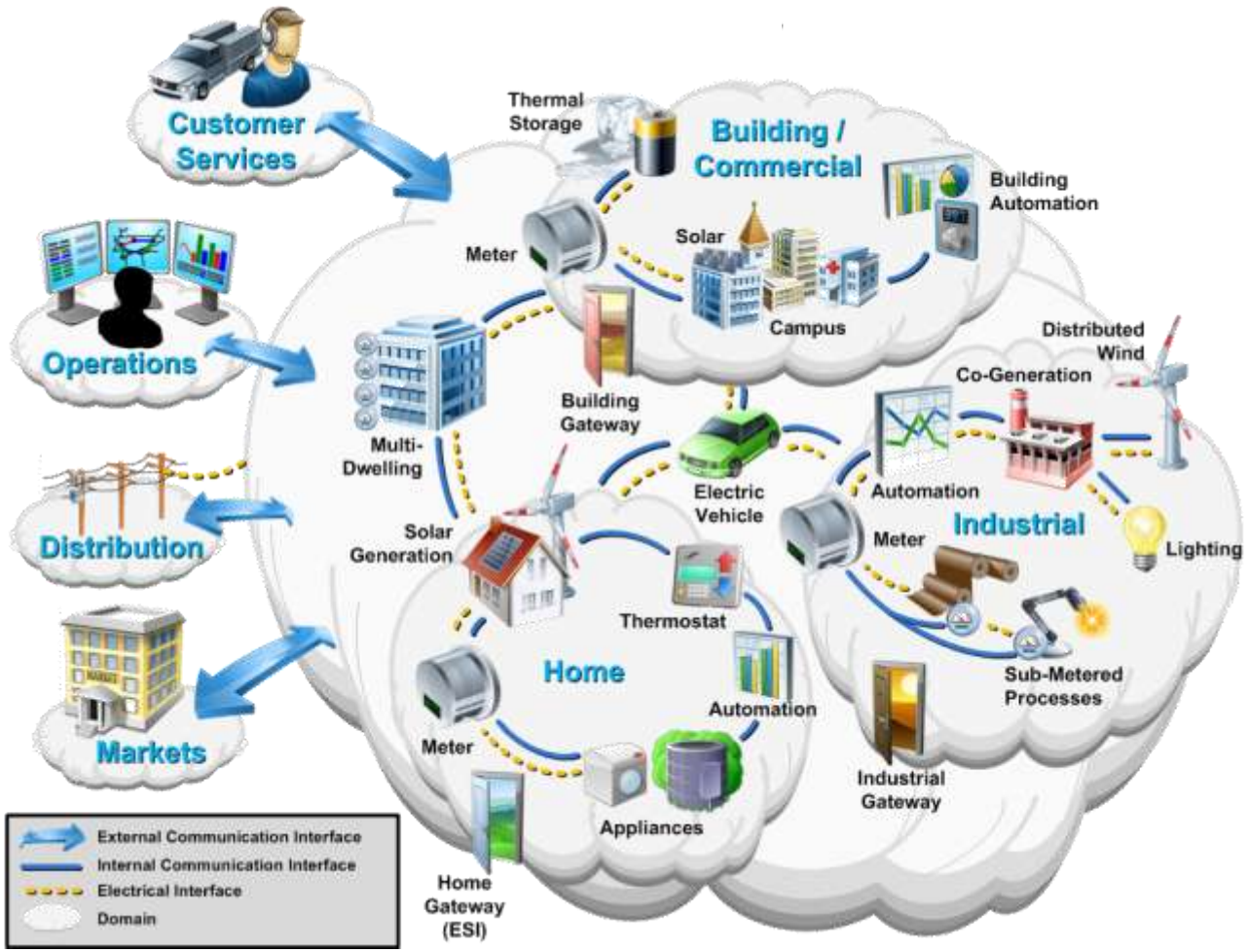
Energy Independence & Security Act of 2007

It is the policy of the United States to support the **modernization** of the Nation's electricity transmission and distribution system to maintain a **reliable and secure electricity infrastructure** that can meet future demand growth and to achieve each of the following, which together characterize a Smart Grid:

1. Increase use of digital controls
2. Dynamic optimization
3. Integrate distributed resources
4. Demand Response
5. "Smart" metering
6. "Smart" appliances
7. Storage and peak shaving
8. Customer control
9. Communication Standards
10. Reduce market barriers

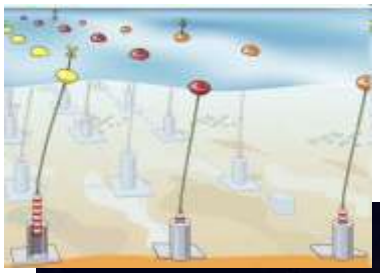
Two-Way Flow of Electricity and Information

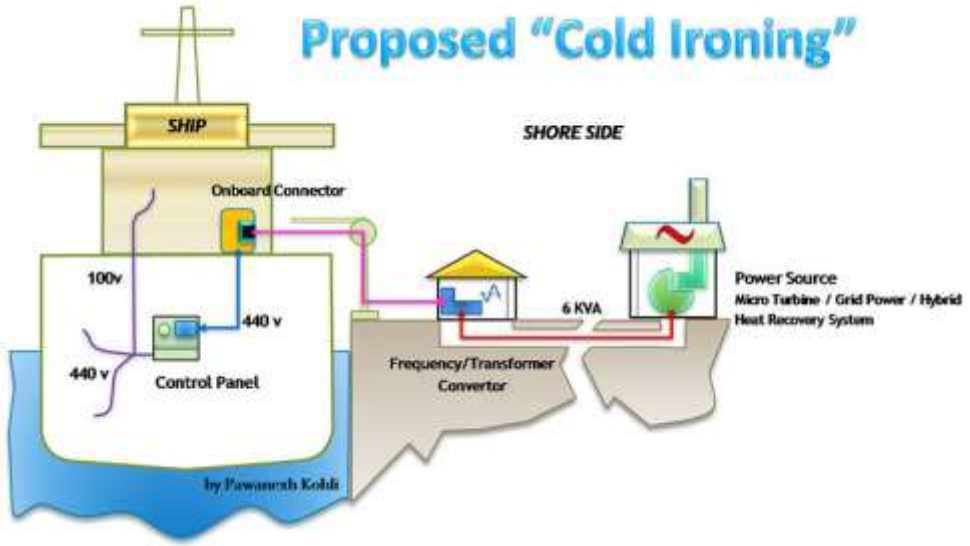
What does Smart Grid look like?

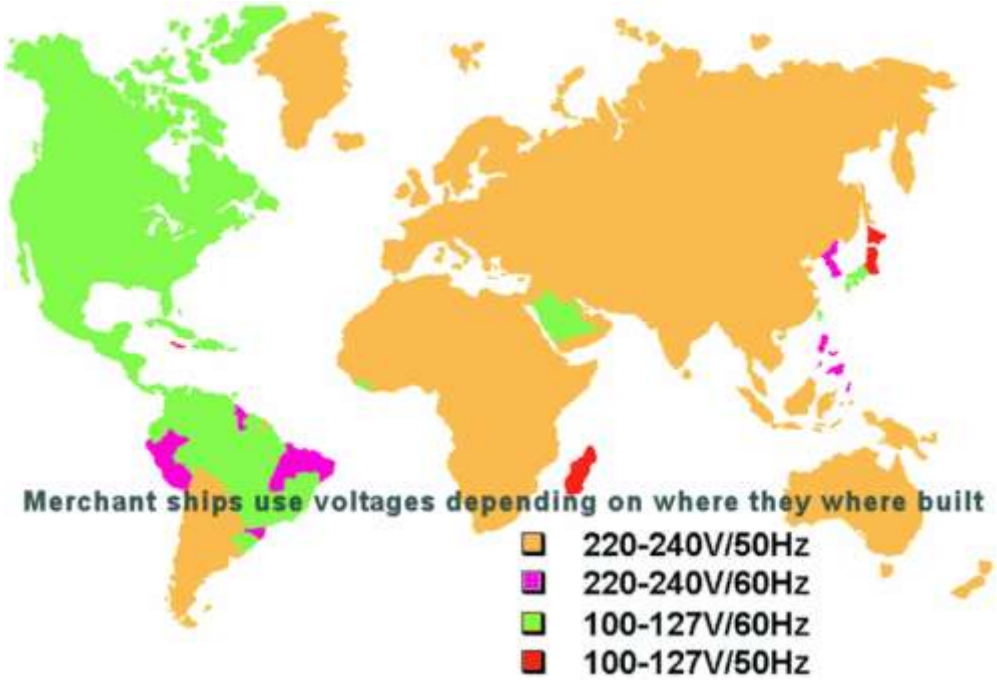


What is Port Electrification?

- Shorepower / Cold Ironing
- Integration of Renewables
  - Solar, Wind, Marine Power
- Electrification of cargo and materials handling







portworld

sustainableshipping

Vancouver port wins award for shore power installation

1st November 2010 22:15 GMT

Port Metro Vancouver has won the 2010 Environmental Award of Excellence from the **Association of Professional Engineers and Geoscientists of BC (APEGBC)** in recognition of its shore power installation at Canada Place.

Vancouver port photo

In 2009, Port Metro Vancouver became the first port in Canada to install shore power for cruise ships. Shore power, also known as cold ironing, allows docked ships to shut down their engines and plug into the city's electrical grid to run all onboard services.

The port said that following its installation, it saw an "immediate and dramatic" reduction in emissions. Ships have so far saved 17,000 litres of diesel fuel, and have been able to cut emissions in half during a normal 10-hour period of usage.

"It's no longer acceptable to have a ship at dock with smoke flying out of its stack," commented Barry McCormack, lead project engineer at Port Metro Vancouver.

During the first year, 11 ships took advantage of being able to cold iron. On average, 200 cruise ships a year visit Vancouver. The port is hoping more ships will take advantage of being able to reduce fuel and eliminate diesel emissions.

"This is good for the environment and the local community. It is a win-win situation," commented McCormack.

g-biz

Cupertino Electric Helps LA's World Cruise Center Go Solar

The Port of Los Angeles has completed its World Cruise Center solar rooftop project, a 71,500-square-foot, 1MW system capable of generating approximately 1.2 million kW-hours of electricity annually for the Los Angeles Department of Water and Power (LADWP) energy grid. Comprised of 5,140 solar modules (210W each), the array was installed by the Energy Alternatives Division of San Jose-based Cupertino Electric Inc. The solar panel project is part of a $42 million upgrade at the World Cruise Center, the home of the original "Love Boat" in the 1970s.

Expected to result in an annual $200,000 energy cost savings, the solar photovoltaic installation is the first phase of a multi-location solar power program that will eventually produce 10MW of solar system generation capacity. The $10.8 million project includes a total of 1.16 million square feet of rooftop solar panels, larger than the size of a football field. Three additional project phases are slated for completion over the next five years.

The roof-mounted system features high-efficiency crystalline modules and utilizes a self-ballasted racking system that does not penetrate the terminal's existing roof. Electricity generated is routed back to the LADWP through an existing electric meter at the World Cruise Center facility.

In another example of the green thinking going on at the Port of Los Angeles, Alternative Maritime Power (AMP) currently used at some container ship terminals will soon be available so cruise ships can "plug in" to shoreside electric power instead of running on diesel power while at berth. Depending on the size of the ship, estimates are that AMP will reduce nitrogen oxide (NOx) emissions by one ton (2,000 pounds) and reduce 85 percent of sulfur oxide (SOx) emissions out of the air each day a ship is at berth and plugged in.

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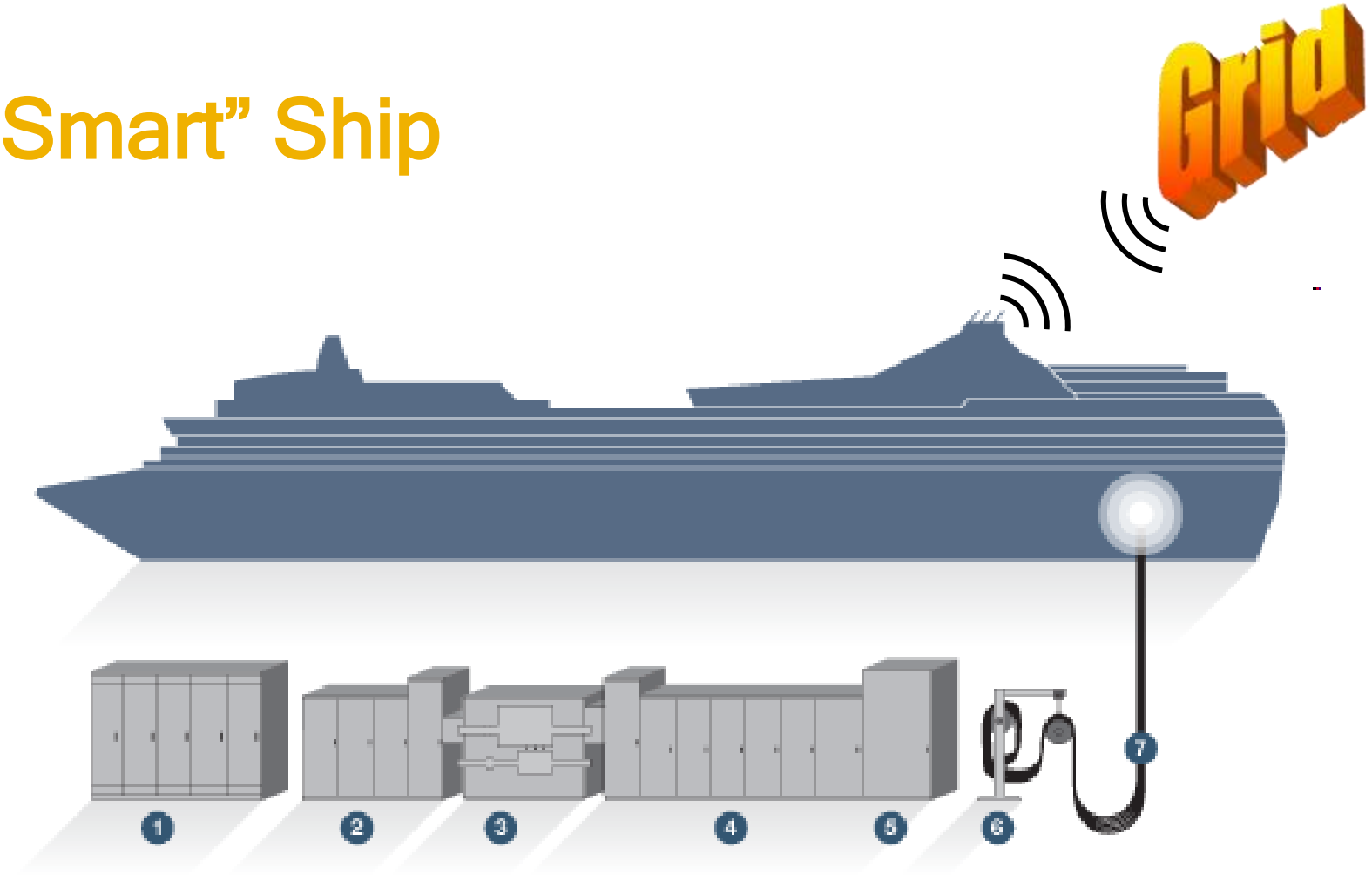
“Smart” Ship



1. Primary metering equipment
2. Primary equipment
3. Transformer
4. Secondary equipment
5. Capacitor
6. Cable Positioning Device (CPD)
7. Ship cables

Dept. of the Navy Energy Goals

- USN and USMC rely too much on petroleum
  - Degrades the strategic position and tactical performance of U.S. forces
- 5 Strategic Goals:
  - Mandatory evaluation of energy factors in the acquisition process
  - “Green Fleet” Objectives
    - Establish Green Strike Group local operations by 2012
    - Green Strike Group under sail by 2016
  - Reduce non-tactical petroleum use 50% by 2015
  - Shore-Based Alternative Energy
    - 50% Renewables by 2020
    - 50% Installations @ net-zero
  - Half of total USN energy consumption from alternative sources by 2020

Source: http://www.navy.mil/features/Navy_EnergySecurity.pdf

Other examples

Non-departmental Executive

- White House Office of Science & Technology Policy (OSTP)
- Environmental Protection Agency (EPA)
- Federal Maritime Commission (FMC)
- Federal Energy Regulatory Commission (FERC)

Executive

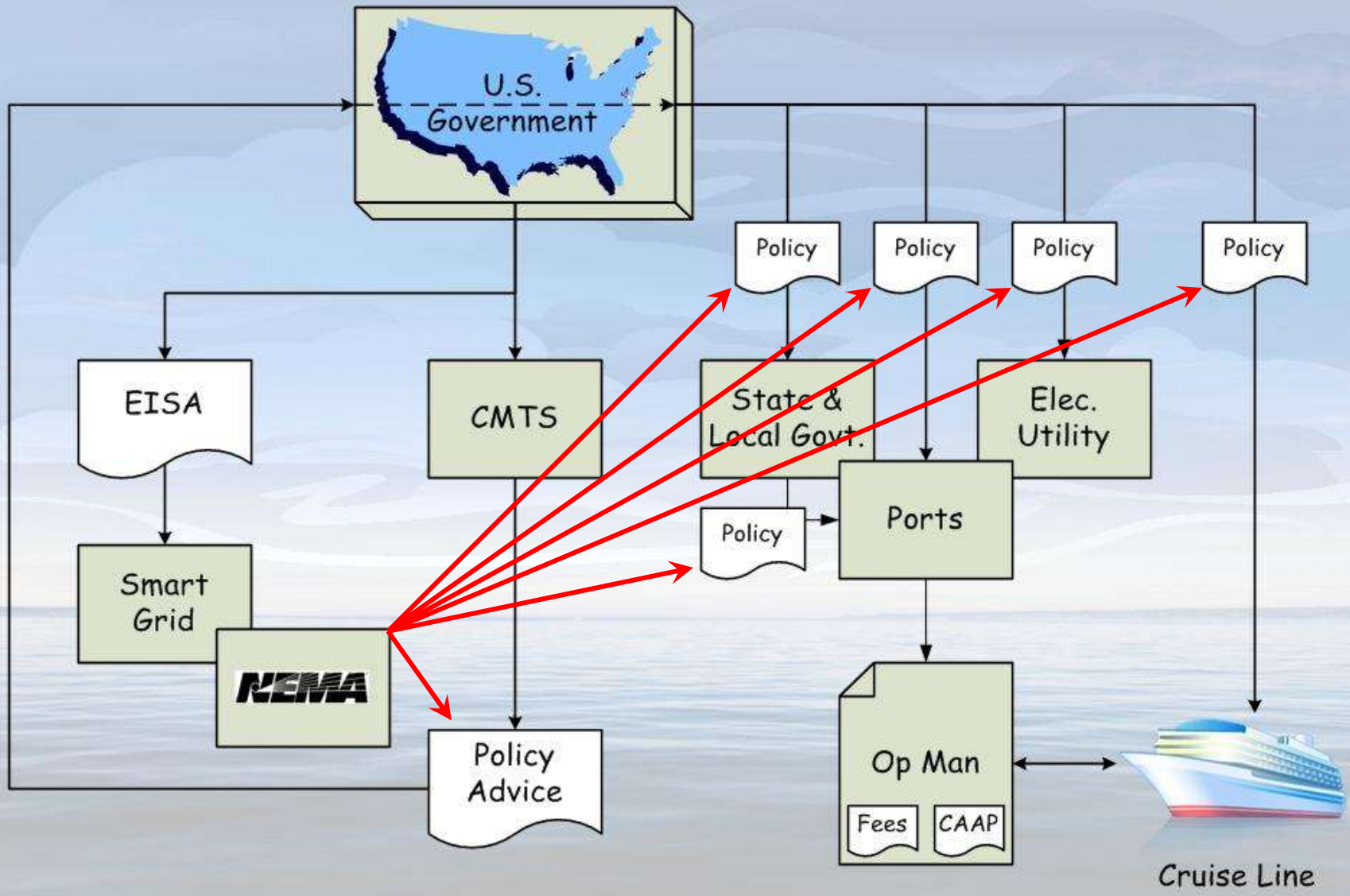
- Dept. of Homeland Security (DHS)
  - U.S. Coast Guard
- Dept. of Commerce (DOC)
  - National Institute of Standards and Technology (NIST)
  - National Oceanic and Atmospheric Administration (NOAA)
- Dept. of Defense (DOD)
  - U.S. Navy
  - U.S. Army Corps of Engineers
- Dept. of Energy (DOE)
  - Office of Electricity Delivery and Energy Reliability
- Dept. of Interior (DOI)
  - Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE)
- Dept. of Transportation (DOT)
  - Maritime Administration (MARAD)
  - Saint Lawrence Seaway Development Corporation (SLSDC)
  - Research, Innovation and Technology Admin (RITA)

If you're not convinced, let us know…we have a 20-page reference document

How is govt reacting?

- Implementing policies and objectives that promote:
  - Clean energy
  - National security
  - Innovation
  - Economic development
  - Jobs

Why should I care?



Where are we seeing this?

- Federal Agencies/Organizations
  - Increase in regulations
  - Strategic Plans focus on sustainability
- State & Local Govts
  - Job creation goals
  - Environmental protection → Industry
- Ports
  - CAAPs, Air Emissions Inventory, Environmental Reports
- Cruise Industry
  - Early adopter of shorepower
  - CLIA at 35: “Steering a Sustainable Course”

How?

- National Conference for Ports
  - Mission:

    To create a federal roadmap, developed by all vested parties, that holistically addresses what needs to be done to develop and support a sustainable and prosperous U.S. marine transportation system
  - Outcome:

    “EnergySTAR” for Ports

    This roadmap would establish environmental and efficiency benchmarks that federal and state agencies would use to establish incentives programs, rewarding ports and industry that achieve these standards

Examples of efficiency/environmental benchmarks & incentives

Technologies

- Port
  - Integrate distributed resources
  - Demand response
  - “Smart” Metering
  - Optimized port design
- Cruise
  - Shorepower
  - Waste management
  - Low-sulfur fuels

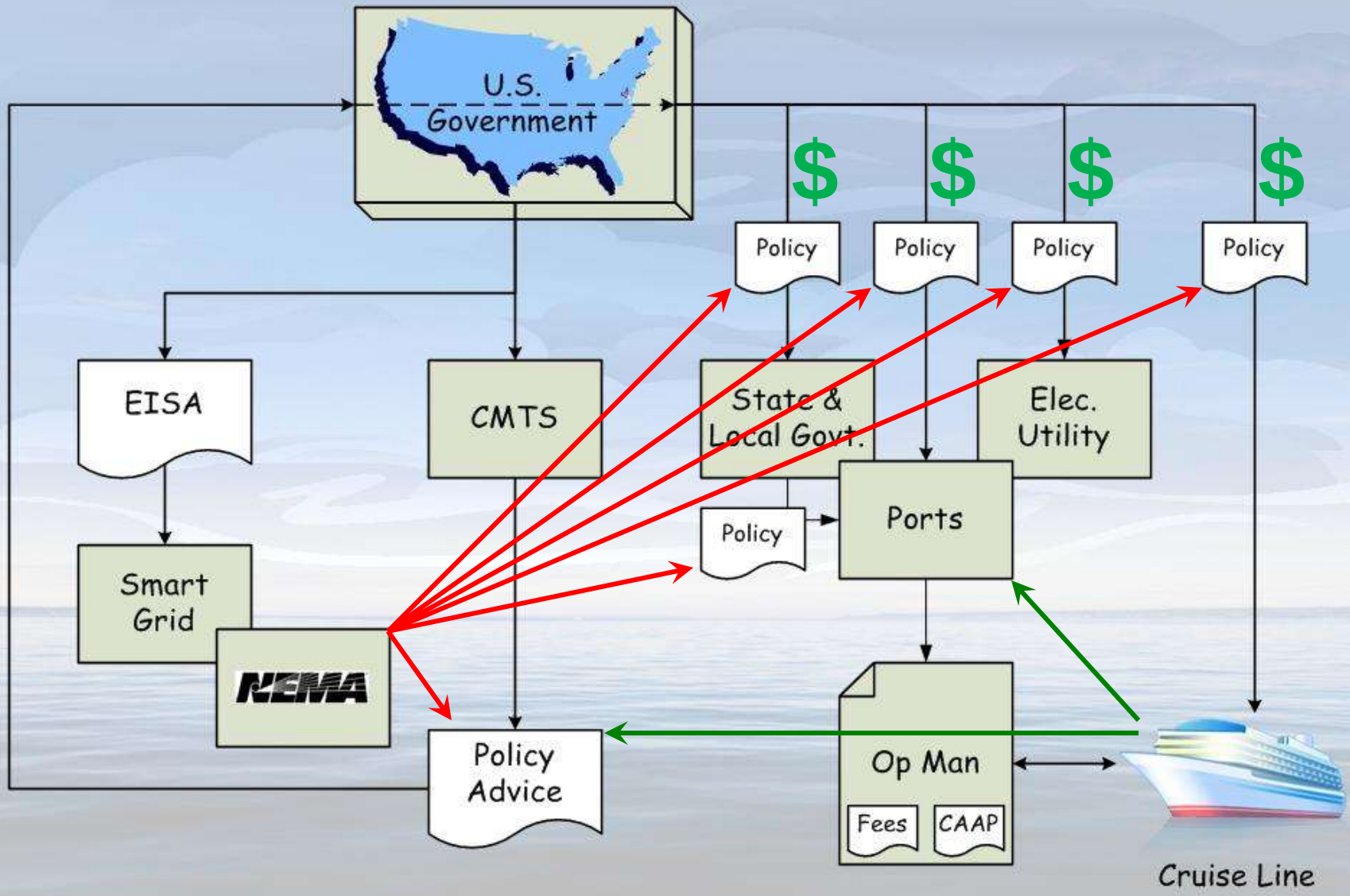
Incentives

- Port
  - Federal tax deduction
  - State incentives for upgrading electrical infrastructure
  - Local utility rebates

$$$

- Cruise
  - Reduced electricity rate
  - Lower fuel taxes
  - Tiered harbor dues

What can I do?


U.S. Government
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Policy
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EISA
CMTS
State & Local Govt.
Elec. Utility
Policy
Ports
Smart Grid
NEMA
Policy Advice
Op Man
Fees
CAAP
Cruise Line

National Conference for Ports Agenda

Ship

Classification Society
Cost Considerations
Plug Type(s)

Port

AAPA
Cost Considerations
Architecture Concerns
Environmentals

Utility

Edison Electric Institute (EEI)
Cost Considerations
Infrastructure Requirements

Legislation

NASA JPL
National Objectives
Climate Incentives
State & Local Responsibilities

Regulation

NEMA
Federal Influence
Enforcement
Policy Integration

Standards

NIST
Ships
Ports
Utilities

Questions

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