Developing Energy Issues and Their Implications for Port Security

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AGENDA

- Background
- Increasing Use of Technology
- Decreasing Energy Prices
- American Energy Renaissance
- Rise in LNG as Commodity and Fuel
- Rise in Energy Black Markets
- Conclusions
- Questions & Contact Info

- Note: The last slide in each section will include references to relevant GAO report(s) and the very last slide includes information on how to access such GAO reports

BACKGROUND

National Maritime Security Advisory Committee (NMSAC)

- NMSAC created by Maritime Transportation Security Act
- NMSAC membership is selected by the Sec. of Homeland Security
- NMSAC may advise, consult, and and make recommendations to the Secretary on maritime security matters
- NMSAC may also make such recommendations available to the Congress
- NMSAC is intended to represent a broad array of maritime stakeholders such as ports, terminals, vessels, labor, state and local government, and academia
- Stephen L. Caldwell was appointed to the NMSAC by DHS Secretary Jeh Johnson in June 2015 (for a 3 year term)

BACKGROUND

US Government Accountability Office (GAO)

- GAO is an independent, nonpartisan agency that works for the US Congress
- The GAO mission is to support the Congress in meeting its oversight responsibilities and to help improve the performance and ensure the accountability of the federal government
- GAO evaluates how the federal government manages programs and spends funds
- Regarding maritime issues, since 9/11, GAO has issued about 100 reports on maritime and supply chain security
- Stephen L. Caldwell was the director in charge of the maritime and supply chain security portfolio from 2006-2015

BACKGROUND

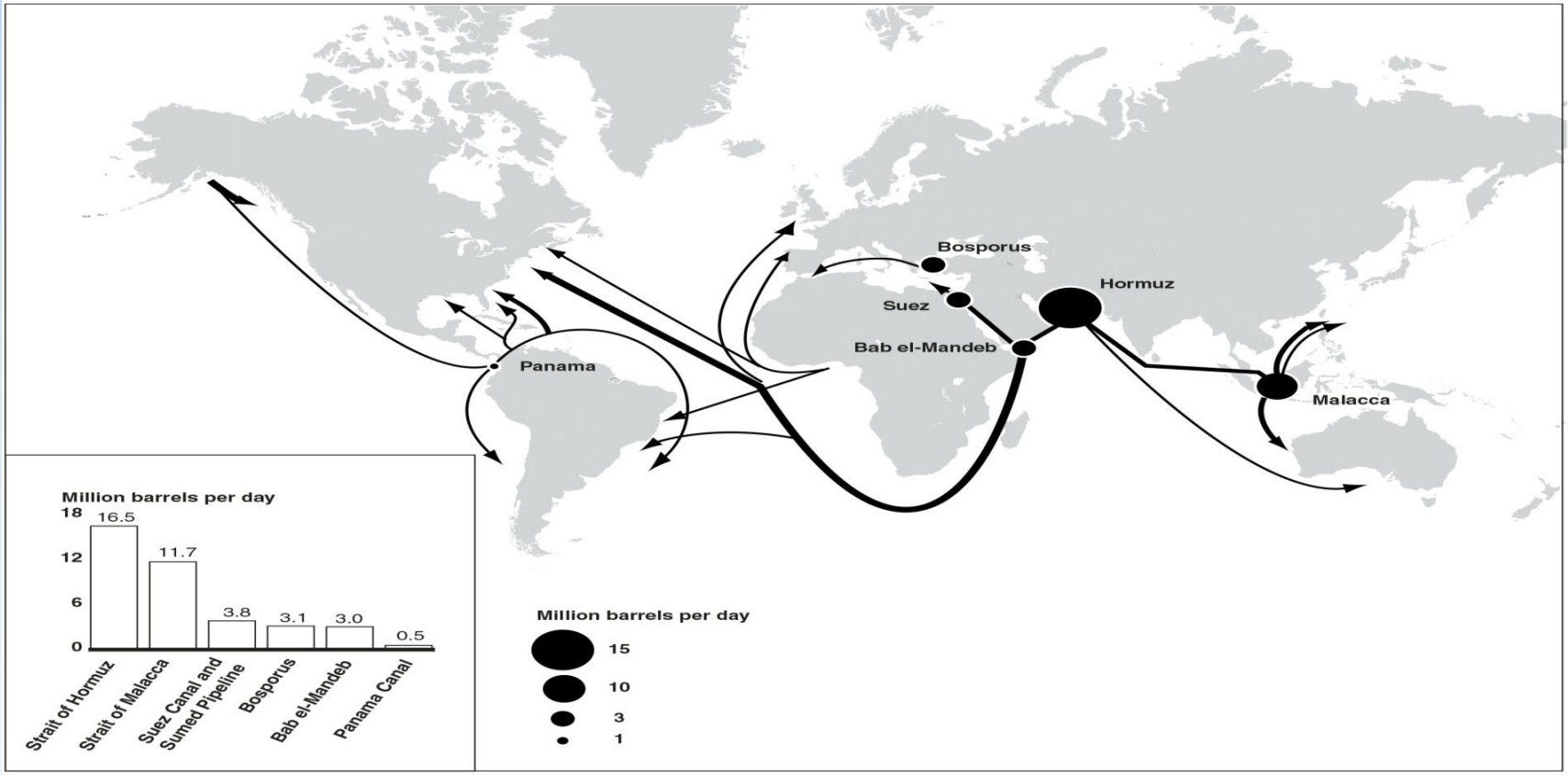
Maritime Energy Vulnerabilities

- Tankers vulnerable due to predictable schedules and routes, and long voyages in open seas & politically unstable waters
- Tankers also sail through well-known choke points such as straits and canals
- Offshore facilities vulnerable due to location in open waters, far away from military or law enforcement response assets
- Facilities are common in well-known locations such as the Gulf of Mexico and North Sea
- Facility officials concerned that small vessels frequently violate safety zones around them
- Types of attacks could include suicide attacks, armed assaults, and stand-off missile attacks

ENERGY TANKER SECURITY

Key Tanker Routes and Chokepoints

Figure 6: Oil Flows and Strategic Shipping Chokepoints



Source: GAO analysis of Energy Information Administration (2004) data.

BACKGROUND

Maritime Energy & Terrorist Attacks

- Regarding tankers, terrorist attacked the MS Limburg in 2002, and MV Star in 2011
- Regarding offshore facilities, in 2004 terrorist using a speed boat with explosives attacked an offshore oil terminal in Iraq, killing 3 US sailors
- The Deepwater Horizon (not a terrorist attack) showed that an incident on an offshore facility could also have massive consequences in economic and environmental terms
- In 2011, US intelligence showed Al Qaeda still interested in targeting maritime energy assets
- More recently, terrorist groups have attacked both tankers and facilities (e.g., the MEND group in Nigeria)

BACKGROUND

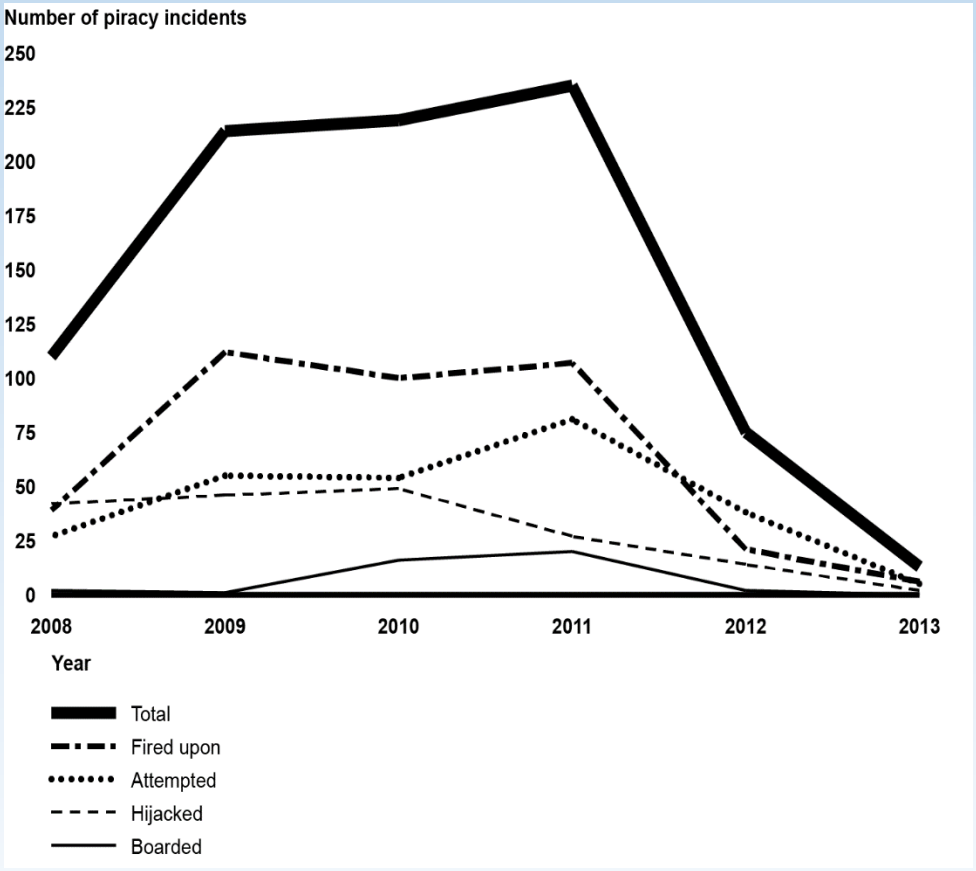
Efforts to Protect Energy Tankers

- US Coast Guard (USCG) has regulations and operations to protect tankers using US ports
- Tankers (regardless of flag) must meet ISPS code and have security officers and plans
- Multiple US agencies run security checks on the crews of inbound energy tankers
- USCG also assesses the security at foreign ports (the departure points for tankers)
- Based on a risk matrix, USCG may board and inspect inbound energy tankers
- Domestically, USCG and harbor police escort tankers based on risk, location and resources
- Internationally, US and allied navies patrol high risk waters (such as Horn of Africa)

BACKGROUND

Rise and Fall of Piracy Off the Horn of Africa (HOA)

- Somali-based piracy off the HOA rose rapidly in 2008, peaked in 2011, then fell to almost zero in recent years
- Decline due to broad efforts to protect vessels included naval escorts, industry BMPs, and private security companies
- Impact on energy tankers was limited because many of them are not “slow and low”
- The Sirius Star was slow and low, but the pirate ransom of $3 million was far below the value of the oil cargo
- Piracy in the Gulf of Guinea and South East Asia will be discussed later in briefing



BACKGROUND

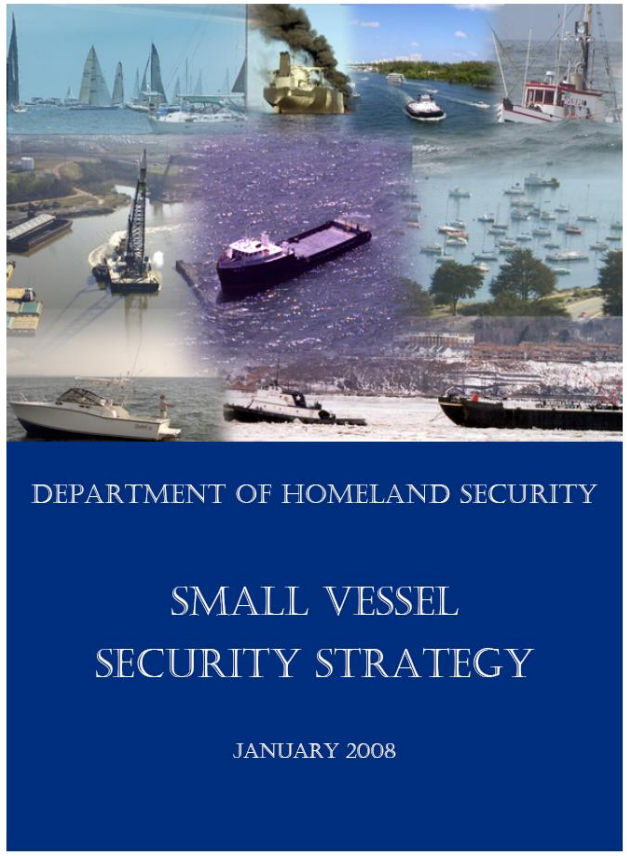
Efforts to Protect Offshore Facilities and Terminals

- Of almost 4,000 offshore energy facilities in Gulf of Mexico, about 50-60 meet the threshold for USCG security regulations
- These 50 facilities (as with shore-side terminals) must have security plans, approved by USCG
- USCG inspects the facilities once per year to ensure compliance with security plans
- USCG & harbor police may conduct patrols at facilities based on risk, location and resources
- USCG also established an Area Maritime Security Committee for the Gulf of Mexico
- Major exercises, such as NLE 2009 test the US response to an attack on, among other things, offshore facilities in the Gulf of Mexico

BACKGROUND

Implications of the Status Quo for Maritime Security

- Threats to tankers and offshore facilities remain, but protective measures (e.g., against small vessel attacks) have long been in place
- Challenge in past years and continuing into the present is limited resources to ensure the security of tankers and facilities
- Agencies, ports and stakeholders have already developed plans and conducted exercises for these standard terrorist and piracy scenarios
- Reference GAO-08-141 on security of energy tankers (focus on USA and International efforts)
- Reference GAO-12-37 on security of offshore facilities (focus on facilities under US regulation)
- Reference GAO-11-883T (congressional testimony that provides an update)



INCREASING USE OF TECHNOLOGY

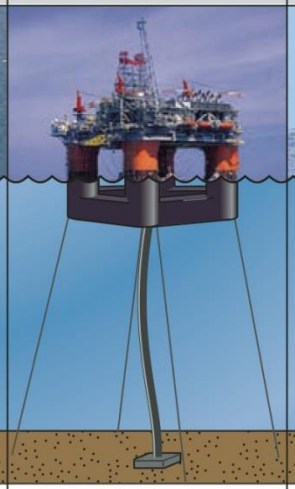
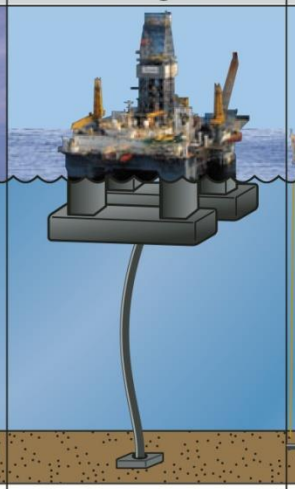
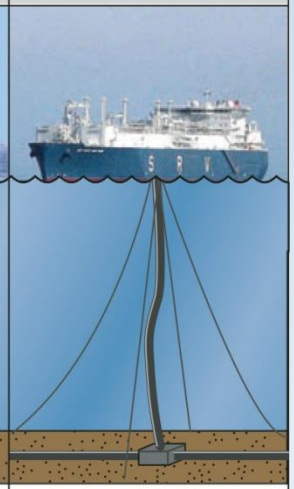
Continued Trend Toward Sophisticated Technologies

- Industry becoming more economically efficient by using more sophisticated technologies to find, recover, store and distribute energy
- Offshore production continues to move to deeper water (e.g., beyond 10,000 feet) and more harsh environments (e.g., the Arctic)
- Hydraulic fracturing technologies ("fracking") has led to significant recovery of oil and gas in previously non-producing land regions
- More sophisticated rigs, and desire to increase efficiency of operations, has led to more networked facilities with remote access control
- DNV GL announced "Solitude" an unmanned floating LNG concept for remote offshore areas
- With the continued trend toward complex technologies, the related regulatory regimes have also become more complex (next slides)

INCREASING USE OF TECHNOLOGY

Complexities of US Regulation of Outer Continental Shelf

Figure 2: Types of OCS Facilities and Deepwater Ports and the Applicable Security Related Regulations

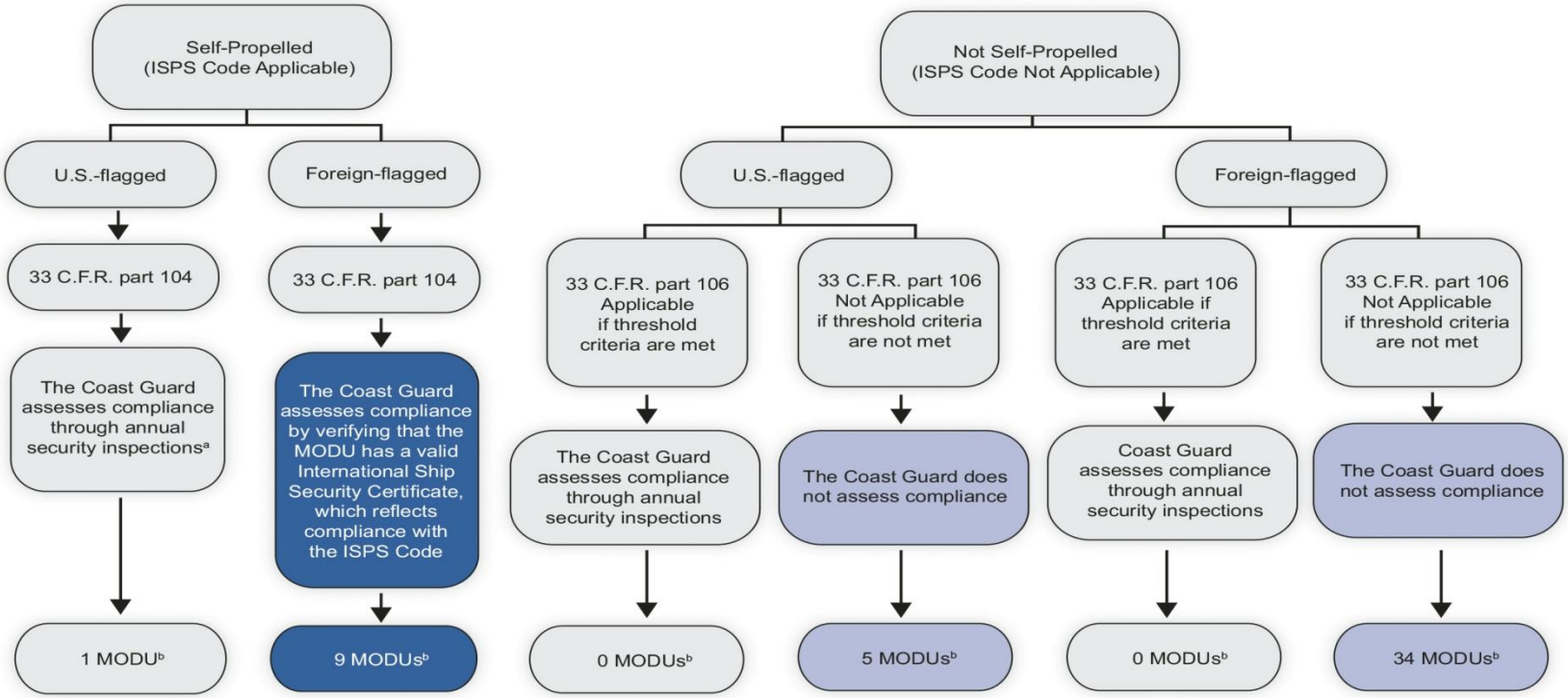
Type of offshore energy infrastructure	Fixed OCS facility[a]	Floating OCS facility[b]		Oil deepwater port	LNG deepwater port
		Floating offshore installation	Mobile offshore drilling unit[c]		
Photograph					
Illustration showing underwater infrastructure					
Applicable security regulation	33 C.F.R. part 106	33 C.F.R. part 106	33 C.F.R. part 106	C.F.R. § 150.15(x)	C.F.R. § 150.15(x)
Number from 2008 through 2010[d]	41	15	1	1	3

Sources: U.S. Coast Guard; BOEMRE; GDF Suez Energy North America; LOOP, LLC; and GAO.

INCREASING USE OF TECHNOLOGY

Complexities of US Regulation of MODUs

Figure 3: Coast Guard Security Requirements Applicable to MODUs Operating in U.S. Federal Waters

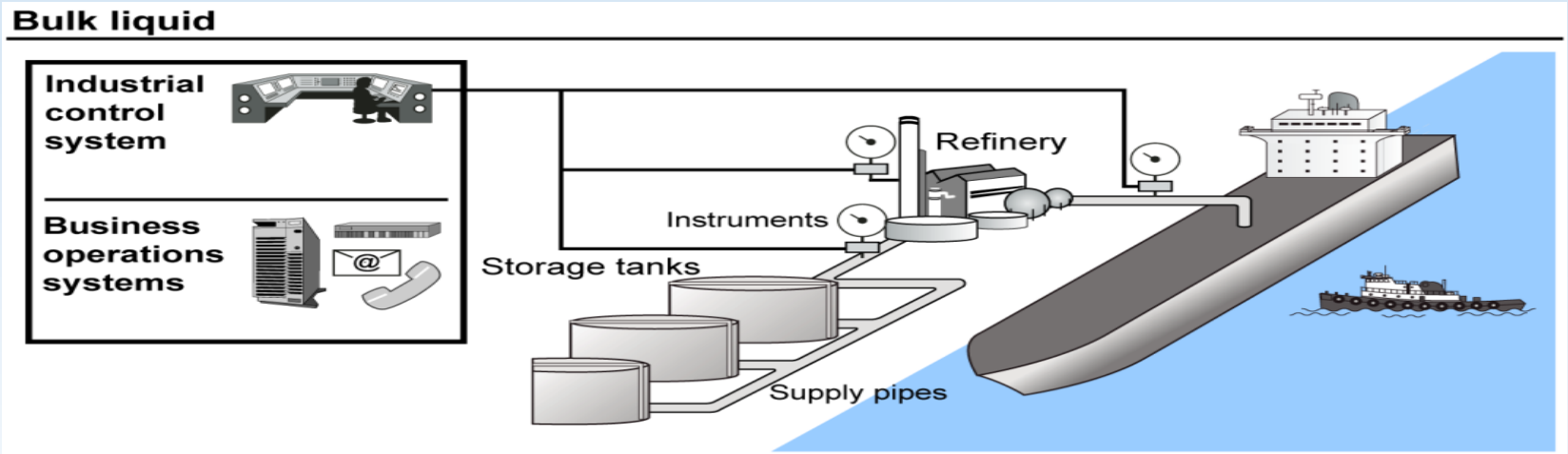


Source: GAO analysis of ISPS Code, 33 C.F.R. parts 104 and 106, and Coast Guard MISLE data, and U.S. Coast Guard.

INCREASING USE OF TECHNOLOGY

Increasing Use of Industrial Control Systems

- Industrial control systems are automated systems used to control industrial processes such as manufacturing, product handling, production and distribution
- These systems are used to operate motors, pumps, valves, signals, lighting, and access controls, and to facilitate the movement of goods throughout maritime terminals using conveyor belts or pipelines
- These systems are now frequently networked to business operations systems, and remote control centers, thus creating potential cyber vulnerabilities

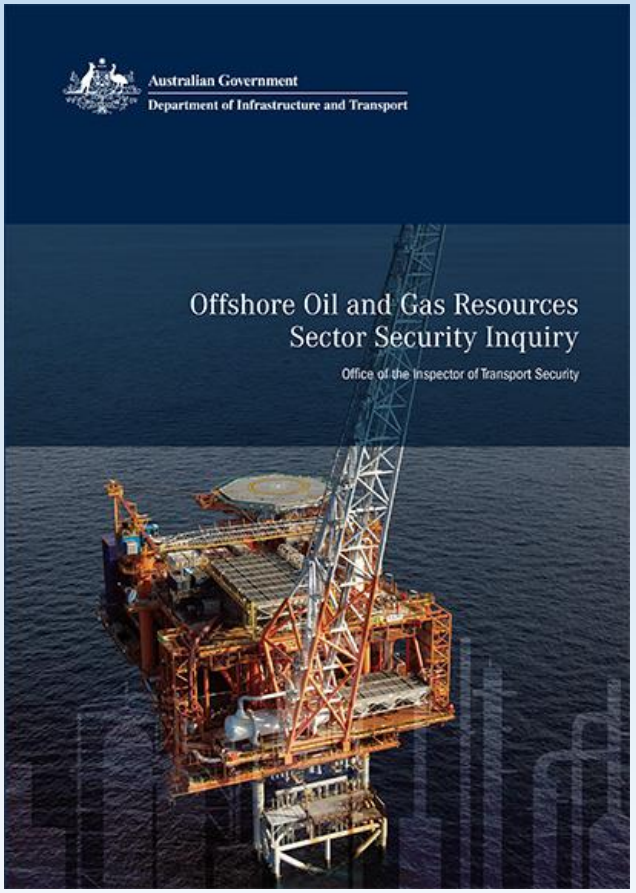


Source: GAO analysis of maritime sector information; Art Explosion (clip art).

INCREASING USE OF TECHNOLOGY

Broad Recognition of Cyber Vulnerabilities

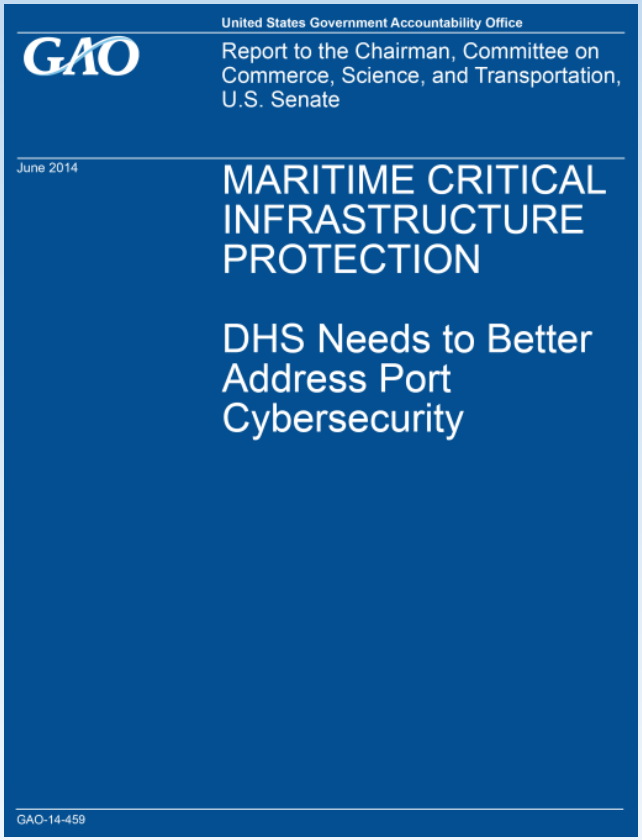
- Several recent studies in US, Europe, and Australia looked at maritime cyber security
- The Australia study specifically focused on offshore energy resources, and made specific recommendations related to cyber security
- The several reports had similar areas of concern and related recommendations:
  - Maritime operations are growing more automated and interconnected
  - Stakeholder awareness of cyber threats and their cyber hygiene has been weak
  - Vulnerabilities exist, with potentially harmful consequences to ports
  - Risk assessments to date have generally focused on physical (not cyber) security
  - Threat information sharing is ad hoc and needs to be improved



INCREASING USE OF TECHNOLOGY

Implications for Maritime Security

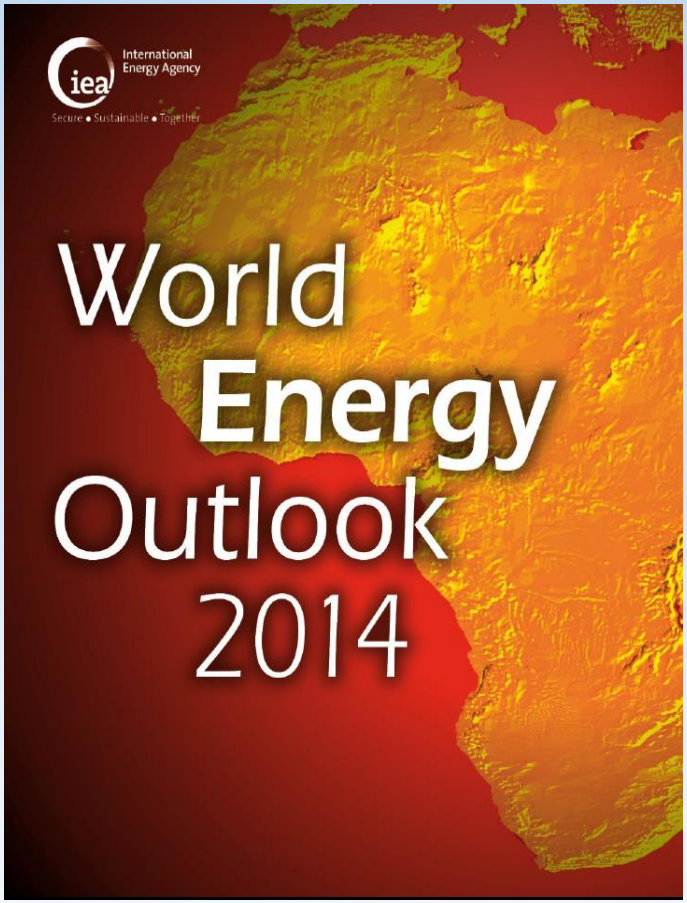
- Overall, government and port stakeholder security personnel should monitor technology developments
- But while the cyber threat is real, what are the best methods to detect and prevent it?
- Questions also remain about the roles of government vs. industry—including the US Government and which agencies should take what roles and responsibilities
- For Maritime Security, this area is under development, with USCG recently hosting conferences, seminars, and issuing its Cyber Strategy
- Reference GAO-14-459 on cyber security at ports (focused on facilities, not vessels)



DECREASING ENERGY PRICES

Prices Have Dropped Significantly

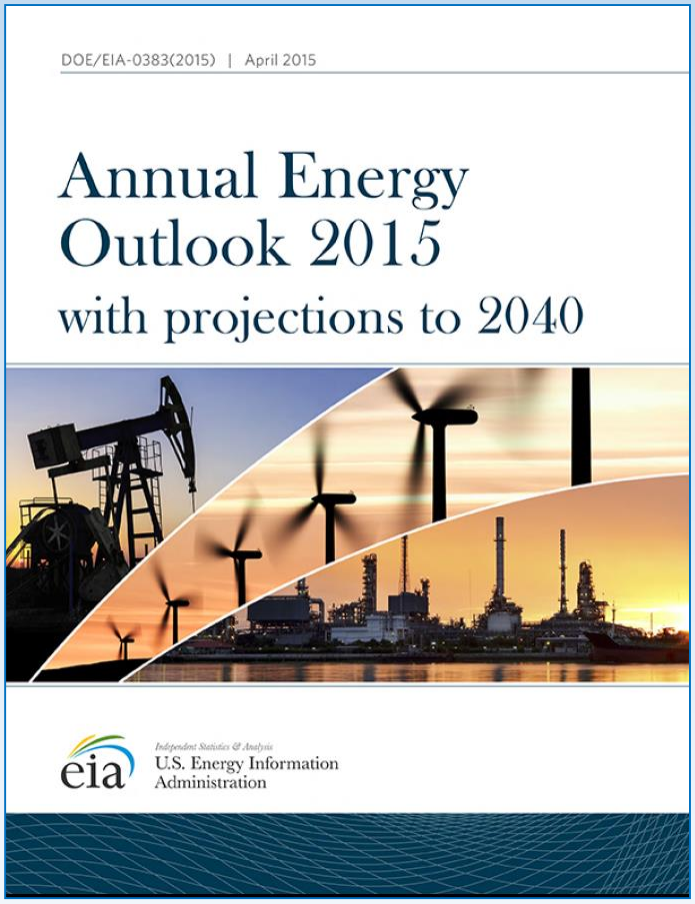
- Since mid 2014, global energy prices fell significantly, to their lowest levels since 2009
- For example, from June 2014 to February 2015, key benchmark prices fell by half
  - North Sea Brent fell by 48% (from about $115 to $60 per barrel)
  - West Texas Intermediate fell by 54% (from about $108 to $50 per barrel)
- The International Energy Agency (based in Paris) publishes an authoritative study each year – *World Energy Outlook*
- However, it's most recent edition (2014) was published in November 2014, which did not address the sharp decline in prices in late 2014 and early 2015
- The 2015 edition will be out November 2015



DECREASING ENERGY PRICES

Reasons for, and Implications of this Decrease

- Many trace the reason to a November 2014 decision by Saudi Arabia not to cut its oil production, thus keeping global supply high
- Analysts speculate that Saudi Arabia did so to preserve their long term market share, to punish other OPEC members violating production quotas, and to force out high cost producers in Canada and the US
- Another reason was increasing supply from the American Energy Renaissance production from shale deposits (see next section)
- US Congressional Budget Office said without fracking, US natural gas prices would be 70% higher than projected prices by 2040
- However, some energy analysts believe that deepwater production—which is more efficient than land based production—will remain relatively strong even at low prices



DECREASING ENERGY PRICES

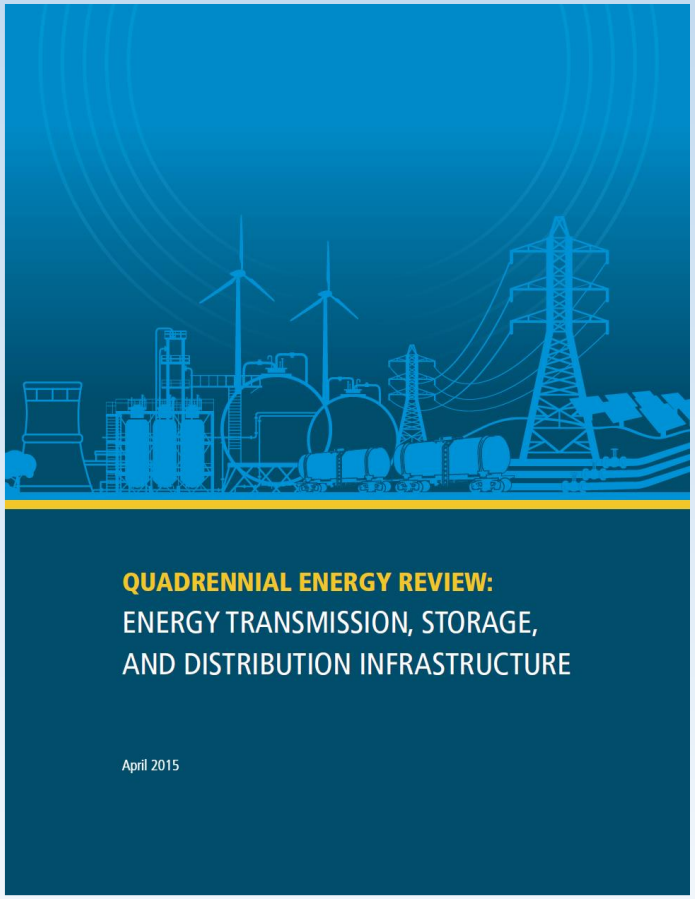
Implications for Maritime Security

- Low prices could have many impacts by:
  - Reducing offshore activities (thus creating fewer maritime targets)
  - Forcing maritime energy firms to cut costs, including security spending (thus increasing vulnerabilities)
  - Making it less attractive for pirates or criminals to hijack tankers and sell the oil on black markets (discussed in later slides)
  - Having unintended consequences such a reducing stability in current energy producing countries
- None of these impacts are certain enough to suggest major changes in port security practices

AMERICAN ENERGY RENAISSANCE

Major Increases in US Energy Production

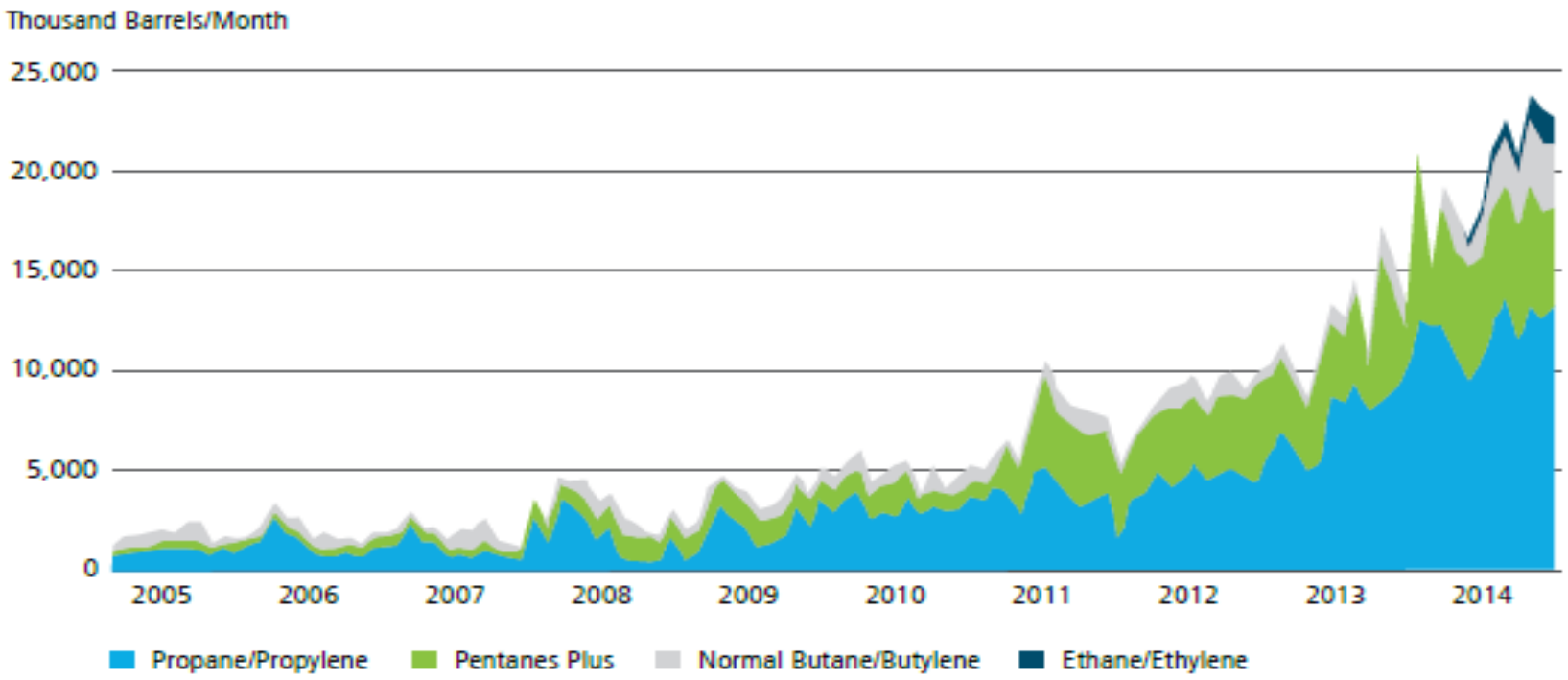
- The US has achieved unprecedented energy production growth, and is now the world's largest producer of oil and gas
- Meanwhile, US petroleum consumption is flat and coal consumption is declining
- These factors, combined with new clean energy technologies and improved fuel efficiency, means US "energy security" is stronger than it has been for 50+ years
- The focus of US energy policy discussions have shifted from worries about rising oil imports and high gasoline prices to debates about how much and what kinds of US energy commodities should be exported
- US Dept. of Energy's *Annual Energy Outlook 2015* predicts US will be net exporter of gas by 2017, and net exporter of oil by 2020



AMERICAN ENERGY RENAISSANCE

Some US Energy Exports Have Increased Ten-fold

Figure 4-3. U.S. Hydrocarbon Gas Liquid Exports[13, h]

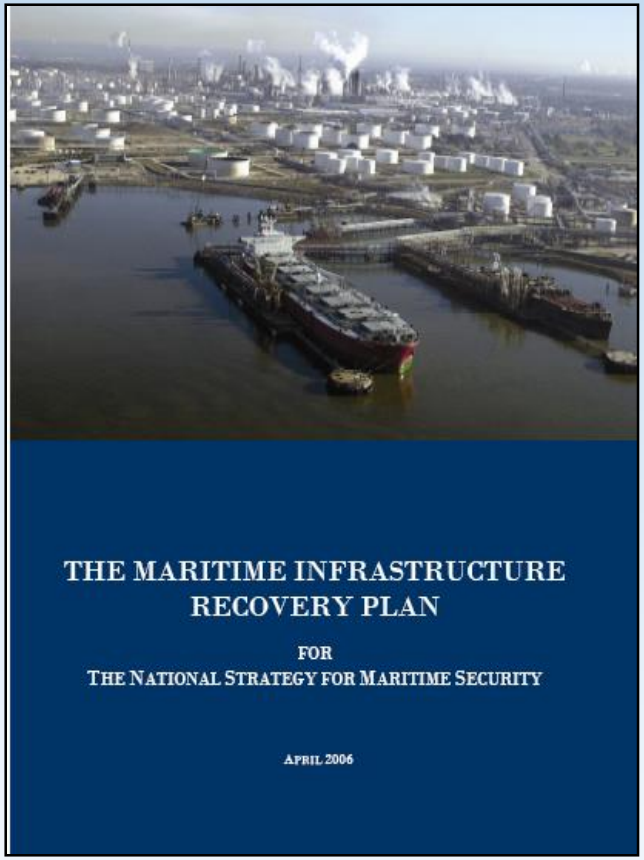


Since 2009, U.S. hydrocarbon gas liquid exports have risen substantially due to increased domestic production and wide international price spreads.

AMERICAN ENERGY RENAISSANCE

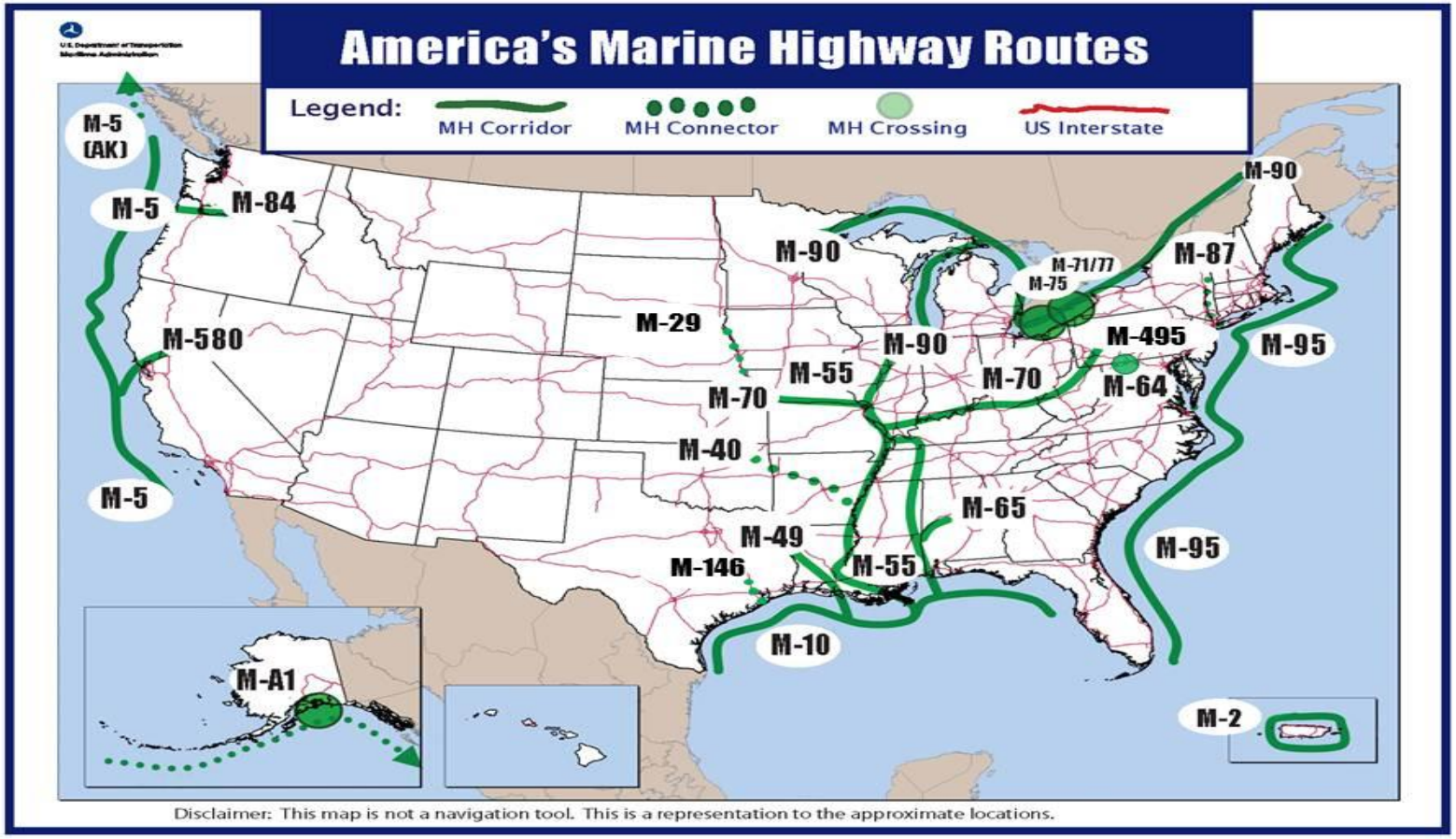
Impact on the US Maritime Transportation System (MTS)

- As the US expands exports of energy, many former import terminals in ports will become export terminals
- Fracking has reversed midstream distribution from “south-to-north” to “north to south” through multiple modes, including maritime
- USCG Commandant noted the “American Energy Renaissance” is causing tremendous change in the United States MTS
- The Mississippi Basin and Intercoastal Water-way have more miles of navigable waterways than the rest of the world combined
- Oil & gas from fracking are now being moved in large quantities in tank barges on the MTS “Marine Highway Routes (next slide)
- More than 4,500 tank barges transport liquid fuels and coal nationwide (see following slide)



AMERICAN ENERGY RENAISSANCE

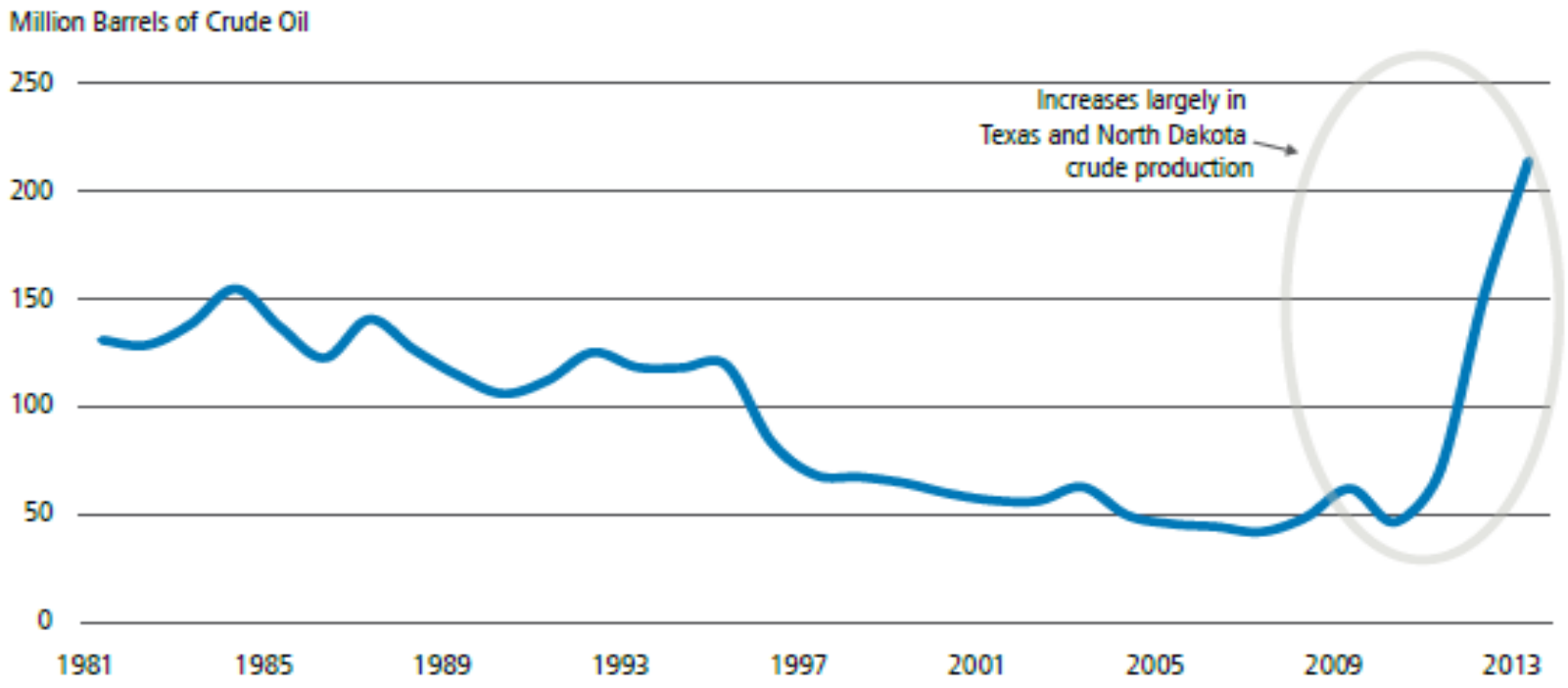
Energy transport and the US Marine Highway Routes



AMERICAN ENERGY RENAISSANCE

Transport of Crude Oil by Tank Barge Up More Than 300%

Figure 5-6. Annual Refinery Receipts of Domestic Crude Oil by Barge[57]



Refinery receipts of crude oil by barge have increased by more than 300 percent since 2010.

AMERICAN ENERGY RENAISSANCE

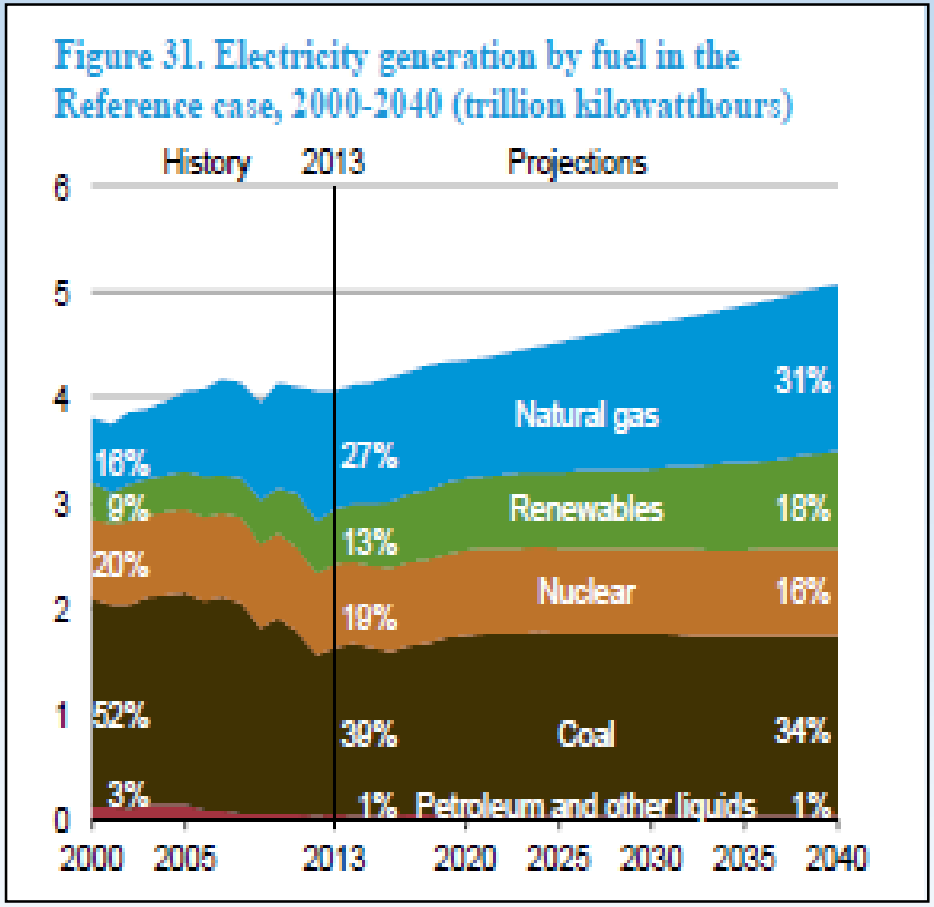
Implications for Maritime Security

- In general, the security requirements of commodity tankers and terminal facilities is similar whether importing or exporting energy
- Thus appropriate security practices are presumably in place for such scenarios
- However, for the US and other nations producing oil and gas in their interior areas, and using rivers and other waterways, the threats and vulnerabilities differ from ports and coastal seas
- Governments and port stakeholders should examine whether new security practices are needed for scenarios involving threats to energy transport in rivers, channels, & locks
- Reference GAO-14-32 on the National Strategy for Small Vessel Security (focused on the small vessel threat and related mitigation efforts)

RISE IN LNG AS COMMODITY AND FUEL

Attractiveness of LNG as an Energy Source

- Natural gas is attractive as an energy source because it burns “cleaner” than oil & coal
- Also natural gas shrinks in volume to 1/600th when liquefied into LNG (by cooling to -260 F) making it much easier to transport
- In US, natural gas is abundant and cheap since production from fracking is significantly higher
- The use of gas to generate electricity in US is projected to grow from 16% (2000) to 31% (in 2040) as shown in the figure
- The US industrial sector as a whole has taken advantage this situation by converting to gas



RISE IN LNG AS COMMODITY AND FUEL

Increasing Use of LNG as Vessel Fuel

- Availability, costs and cleanliness are also making LNG attractive as a vessel fuel, particularly as regions (e.g., California) require cleaner fuels
- US companies like Crowley and TOTE are moving ahead smartly, and have ordered several purpose-built LNG-fueled vessels
- Crowley is expanding its business for LNG as both a commodity and fuel in the Caribbean, and is conveying LNG in container-size quantities
- At international level, IMO is moving ahead with safety and crew training guidelines for vessels fueled with LNG (and other "low flashpoint fuels")
- At US level, in 2015 USCG has issued policy letters for LNG-fueled vessels and LNG bunkering facilities, and design standards for US barges intending to carry LNG in bulk (e.g., non-self-propelled barges for LNG bunkering)

IMO

RISE IN LNG AS COMMODITY AND FUEL

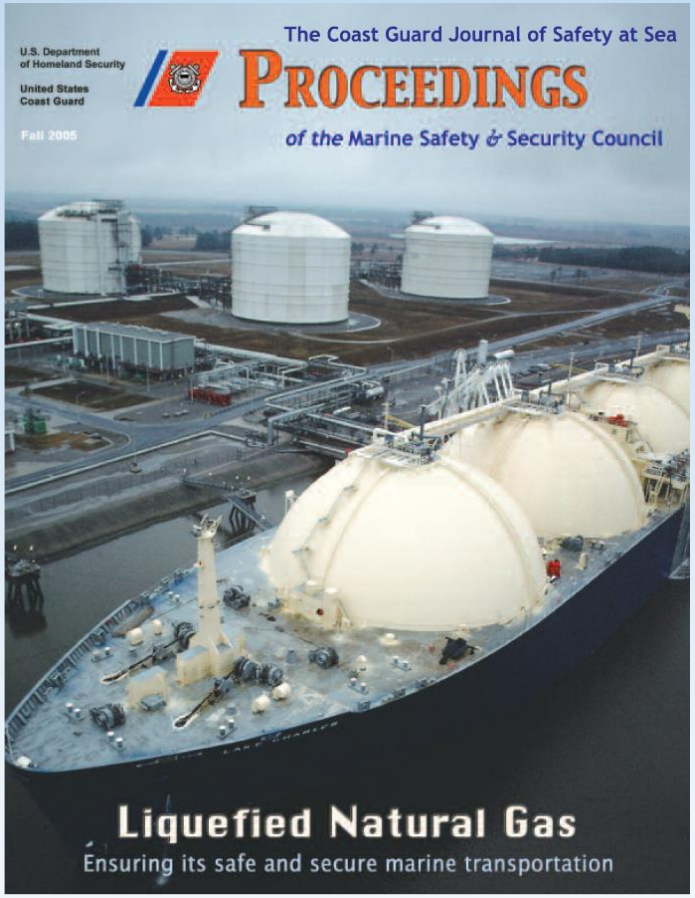
Security of LNG Tankers and Facilities

- While LNG is considered a “low flashpoint fuel” and LNG vapors mixed with air are not explosive in an unconfined environment, the mix could be explosive in confined spaces
- Despite the science, some in the public have strong fears regarding LNG explosiveness
- US security measures for maritime LNG assets vary, with rural areas (e.g., Lake Charles) taking few steps, while urban areas (e.g., Boston) taking steps to include a 6 vessel escort, and shutting down the airport runway as well as a major bridge
- The US is now positioned to become a major exporter of LNG, just 10 years after accelerating its import capacity
- Example, in May 2015, US Dept. of Energy authorized the export of LNG from Cove Point MD, a long-time LNG import terminal

RISE IN LNG AS COMMODITY AND FUEL

Implications for Maritime Security

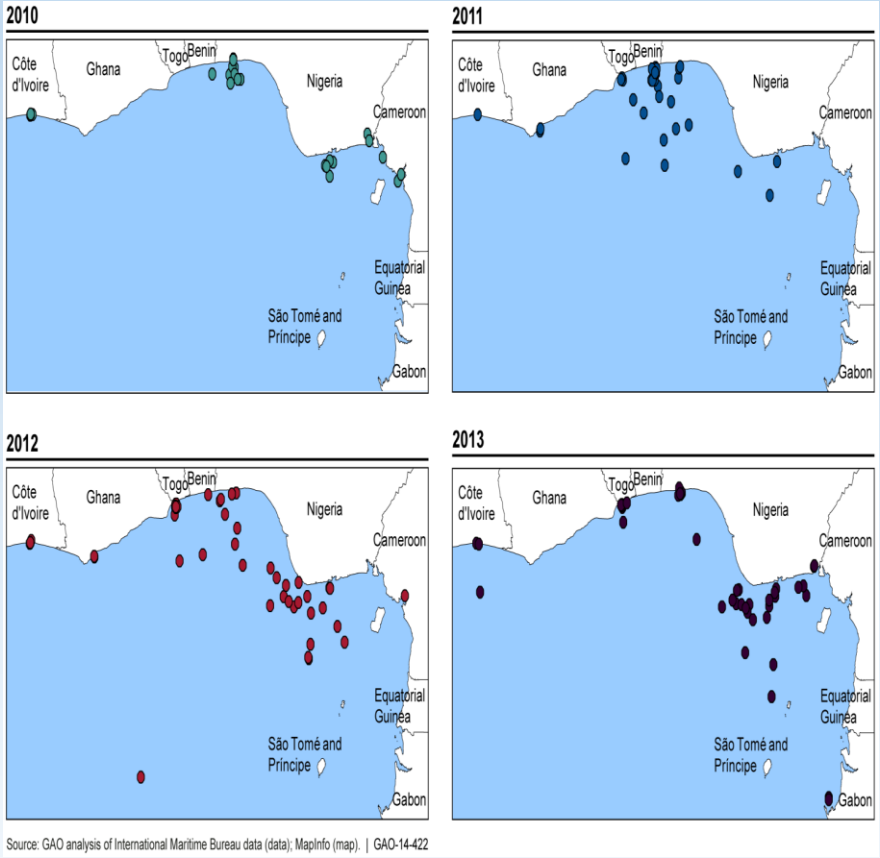
- In general, the security requirements of LNG tankers and facilities is similar whether importing or exporting LNG
- However, LNG as a fuel raises new issues about its explosiveness in confined spaces such as below decks on vessels
- Governments and port stakeholders should follow developments and designs of vessels using LNG as fuel, and whether they require new security practices
- One question that remains open is the potential impact of terrorist (using explosives) or law enforcement (using weapons) actions below decks, and whether LNG leaks into a confined space could cause a fire or explosion
- Reference GAO-07-316 on maritime security for LNG commodity tankers (focuses on potential consequences of an attack)



RISE IN ENERGY BLACK MARKETS

Piracy in Gulf of Guinea (GoG)

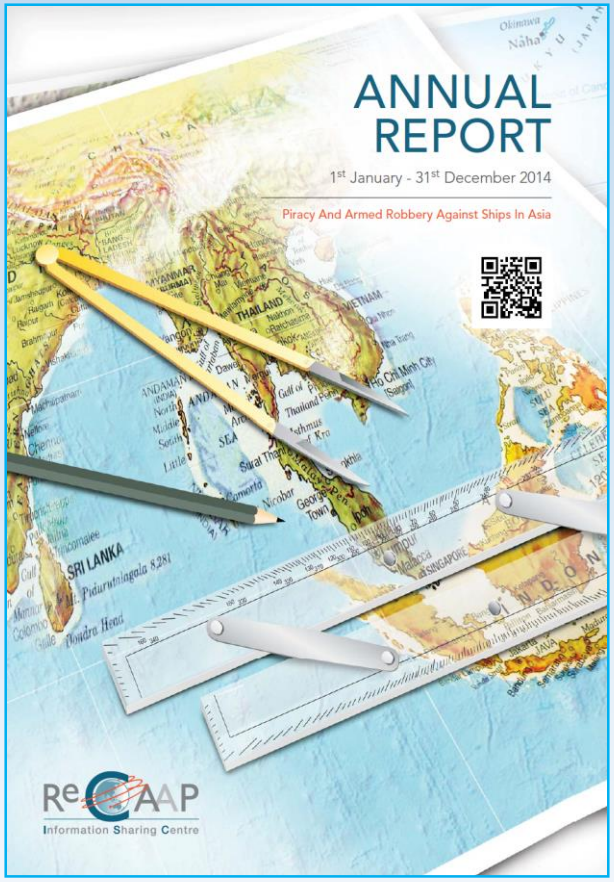
- Piracy and other maritime crime have given rise to growing energy black markets for stolen oil
- Unlike piracy off HOA—with its business model focused on vessels & crew for ransom—the piracy in GoG has a business model focused on stealing energy commodities
- Chatham House conferences and reports on Nigeria found attacks on tankers are well choreographed, conducted with operational knowledge, & intelligence based
- Chatham House also found corruption and fraud are rampant in the country's oil sector, and that overall Nigerian crude oil is being stolen on an "industrial scale"



RISE IN ENERGY BLACK MARKETS

Piracy in South East Asia (SEA)

- Piracy is up in SEA by 23% (up to 183 incidents)
- Similar to GoG, part of the piracy business model in SEA focuses on stealing energy cargoes
- This was highlighted in RECAAP's Annual Report and two "Special Reports on Incidents of Siphoning of Fuel/Oil at Sea in Asia"
- Of 13 incidents categorized as "very significant" in 2014, all involved siphoning of ship fuel/oil
- Majority of incidents occur at night in remote locations to "buy time" to bring another ship along side, complete siphoning, then escape
- In 3 incidents, tankers had their names repainted and renamed to mask their identities
- RECAAP assessed at least 3 organized criminal syndicates were involved in these incidents
- This surge attributed to high market prices, high taxes on fuel/oil, and demand in black markets



RISE IN ENERGY BLACK MARKETS

Sanctions Against Pariah States

- The United Nations Security Council adopted several resolutions (e.g., UNSCR 2087 & 2049) imposing sanctions on North Korea and Iran which impact maritime energy shipping
- However, North Korean and Iranian shipping lines have worked to get around sanctions
- The EU has ceased all purchases of Iranian oil and gas, and other countries have cut back
- The US has also adopted a number of its own Executive Orders and laws related to sanctions against Iran, some that impact maritime energy shipping
- For example, laws PL-104-172 and PL-112-239 provides for sanctions on firms that deal with Iran's energy and shipping sectors
- In the 113th Congress, additional legislation proposed that shuts Iran out of oil exports

RISE IN ENERGY BLACK MARKETS

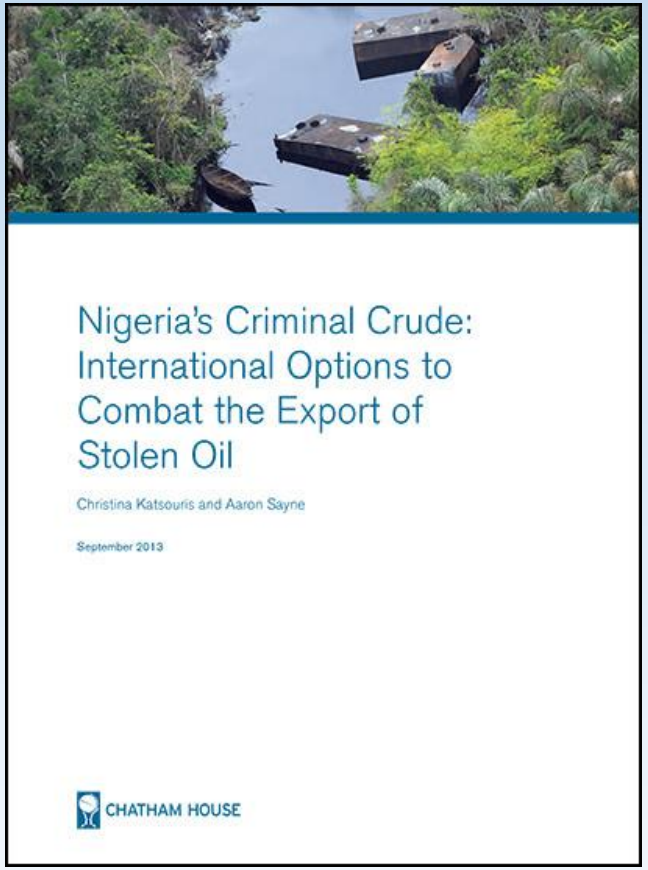
Non-State Actors, And Legal Issues

- There are also reports that non-state actors (who are not traditional pirates) are using tankers to sell “illegal” oil on black markets
  - Libyan and Islamic State rebels
- Whoever conducts it, and wherever it occurs, there are legal issues depending on:
  - The location of the activity (whether in international or territorial waters)
  - The ownership and flag of the vessel and the stolen energy cargo
  - The level of forensic evidence needed to determine the oil origin and ownership
  - The authority (or permissions) granted to the law enforcement or military force conducting the interdiction
  - The complicity of corrupt authorities

RISE IN ENERGY BLACK MARKETS

Implications for Maritime Security

- Governments and international organizations could develop various stolen oil scenarios and explore what appropriate legal procedures to include in its training
- Western governments could train partner countries in areas prone to black markets
- Governments and international organizations could Chatham House report “International Options to Combat the Export of Stolen Oil”
  - Sample recommendations include better intelligence on volumes of stolen oil, movements of stolen oil, the money trail, & related political and security risks
- Reference GAO-10-856, GAO-11-449T and GAO-14-422 on US efforts to combat piracy



CONCLUSIONS

Conclusions for Government and Port Stakeholders

- Long standing threats to maritime tankers and facilities
  - Continue plans/exercises for standard terrorism and piracy scenarios
- Technology complexity and cyber security
  - Monitor new technology developments in general
  - Ongoing discussions on role of USCG & Industry in countering cyber threats
- American Energy renaissance & increased river traffic
  - Threat to seaport export terminals similar to import terminals
  - New traffic on inland waterways, secure rivers, channels and locks
- Rise of LNG as a commodity and fuel
  - New LNG export terminals can learn from experienced import terminals
  - Follow developments and vessel design for LNG as a fuel
- Rise of energy black markets
  - Determine legal basis for interdicting tankers with stolen product
  - Train tools of evidence to determine sources of stolen product

QUESTIONS AND CONTACT INFO

Questions?

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For access to referenced GAO reports, see GAO website: www.gao.gov