National Security Forum

Vice Admiral Lee Gunn, USN (Ret.)

Mr. Edward T.(Tom) Morehouse, Jr.

March 24, 2021

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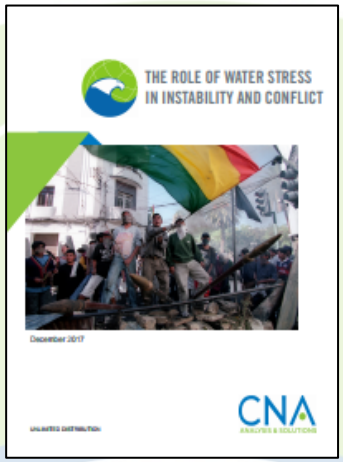
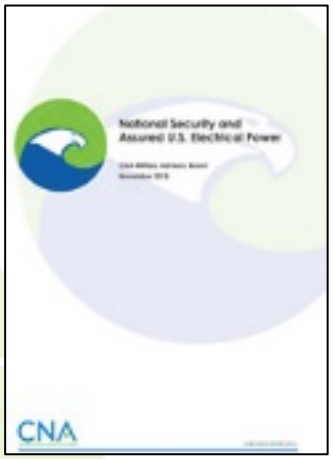
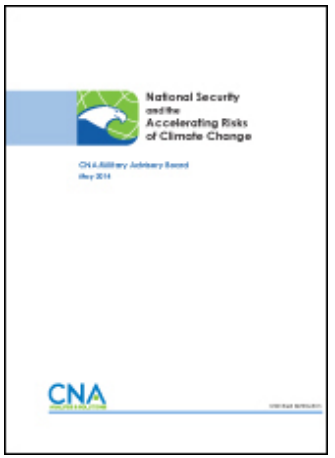
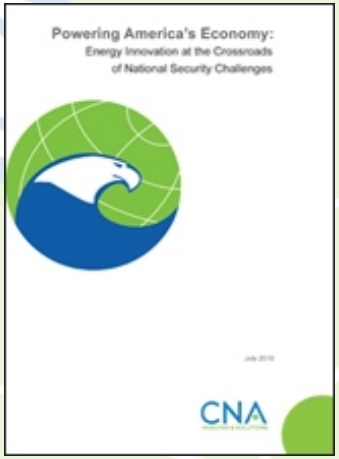
CNA Military Advisory Board Reports

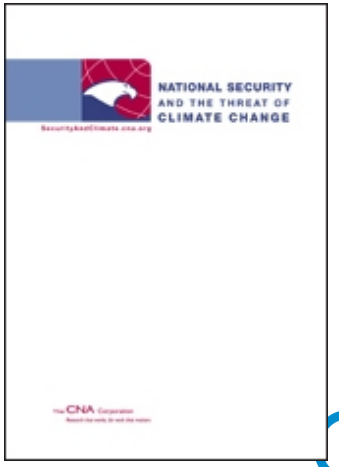
- 8 reports (2007-18) on ***climate change*** and ***related threats*** to our national security. The ***looming and inevitable growth of energy demand and transition to new forms of energy, among them***.











Biden Administration Interim National Security Strategic Guidance

- ***Inclusive conception of security (food, water, climate)***
  - "We will invest in climate-conscious food and water security and resilient agriculture, preventing disease and improving public health and nutrition"
- ***Recognizing inextricable link between domestic and international security***
  - "Because traditional distinctions between foreign and domestic policy – and among national security, economic security, health security, and environmental security – are less meaningful than ever before, we will reform and rethink our agencies, departments, interagency processes, and White House organization to reflect this new reality."
- ***Importance of diplomacy, partnership and capacity building as elements of national power.***
  - "We will make smart and disciplined choices regarding our national defense and the responsible use of our military, while elevating diplomacy as our tool of first resort."
  - "Together with our allies and partners, we can modernize the architecture of international cooperation for the challenges of this century, from cyber threats to climate change, corruption, and digital authoritarianism."
- ***The clean energy transformation is a central pillar of our economic recovery efforts***

Climate and Energy

- **Intertwined and Emerging National Security Threats**
  - The impacts of a changing climate can act as an accelerant of instability in fragile states, lead to greater demand for our military, and impact our economic and national security here at home.
  - Expected increases in global energy demand and the emergence of advanced energy options create opportunity for the U.S. as well as our adversaries and allies to gain diplomatic, economic, and military power.

International Impacts of a Changing Climate

- ***International impacts of a changing climate***
  - **Interrelated and cascading effects** climate change events.
  - Complex changes in **urbanization, population growth, and the movement of people to coastal areas**
    - Make climate change projections more prominent strategic security risks.
  - **Stress to the water-food-energy nexus is a growing security concern**.
  - The **United States must strengthen its international alliances** and partnerships in preparing for the impacts of predicted climate change.

Climate and Energy: Intertwined and Emerging National Security Threats

- ***Climate Change impacts on the U.S. Military***
  - New demands on the operating forces
  - Rise of non-state actors and new adversaries
  - Changes to force structure
  - Operations, training and exercises in new locations
  - New training, recruiting, and infrastructure needs

Climate and Energy: Intertwined and Emerging National Security Threats

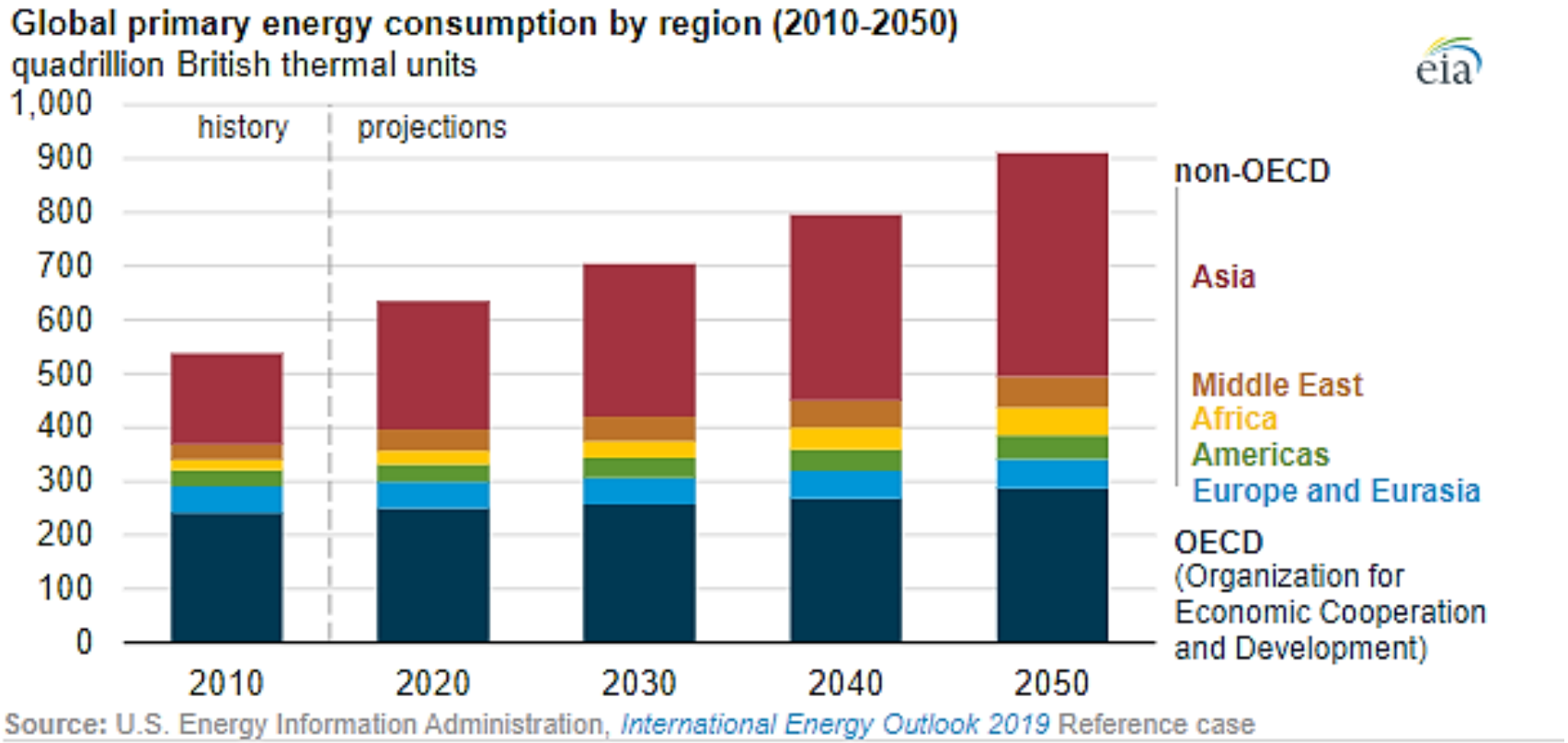
- ***Climate change impacts within the United States will place key elements of our national power at risk and threaten our homeland security.***
  - Impacts on critical infrastructure.
  - Threaten major sectors of the U.S. economy.
  - Stress social support systems such as first-responders.
  - Directly tied to the fragility of the electric grid.

Climate and Energy: Intertwined and Emerging National Security Threats

- ***At the same time as the climate impacts are developing, we are seeing a transformation to a new global energy landscape***
  - **50 percent increase in energy demand by 2050**
  - New centers of demand
  - Adversaries (and allies) investing to secure long term energy supply
  - Emerging markets for renewables create new diplomatic and economic tethers across nations.

Nellis Air Force Base, Nevada.

The transitioning global energy landscape



Source: U.S. Energy Information Administration, *International Energy Outlook 2019* Reference case

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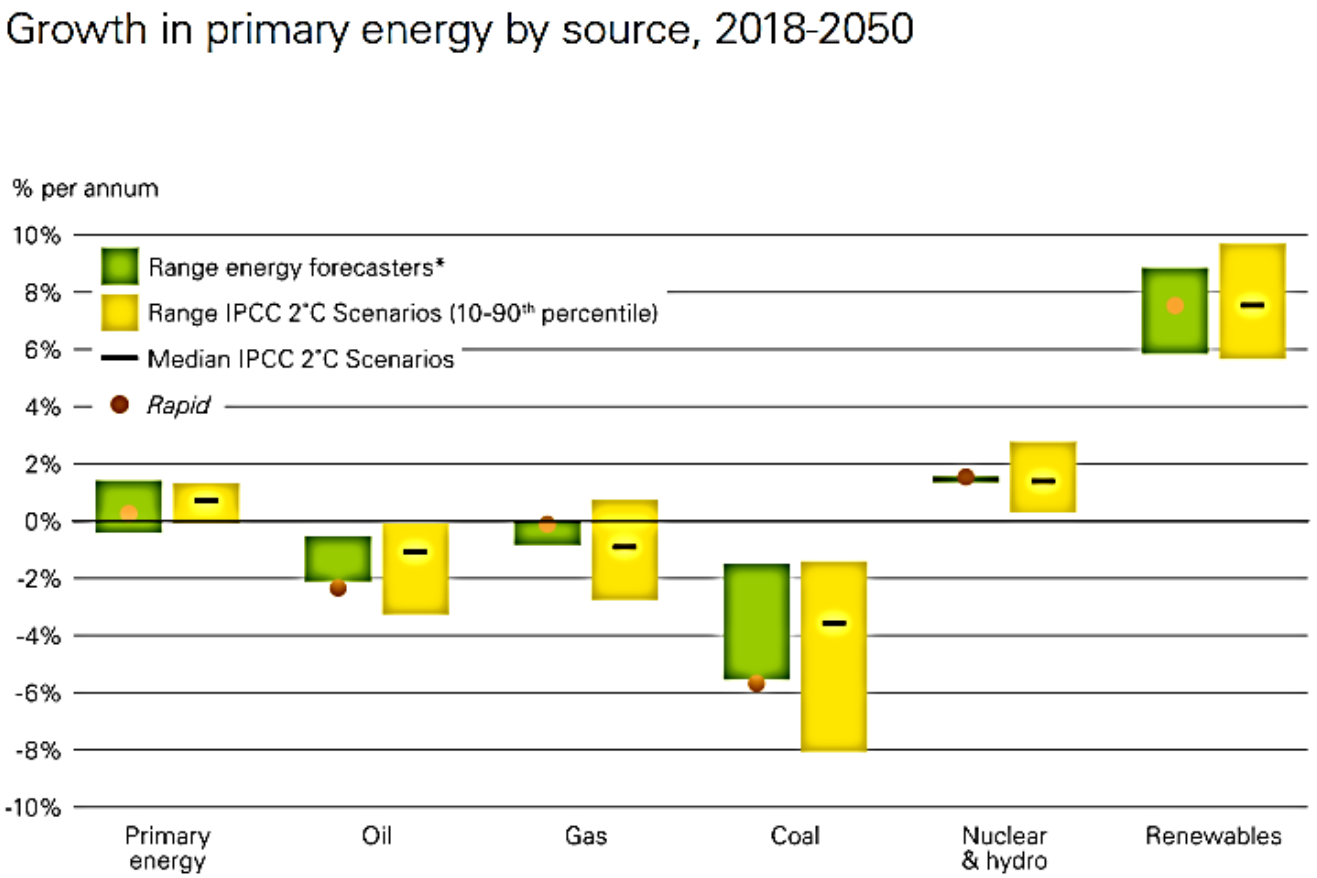
So Where Is The World Headed by 2050?



Source: BP Energy Outlook: 2020 edition, pg. 143

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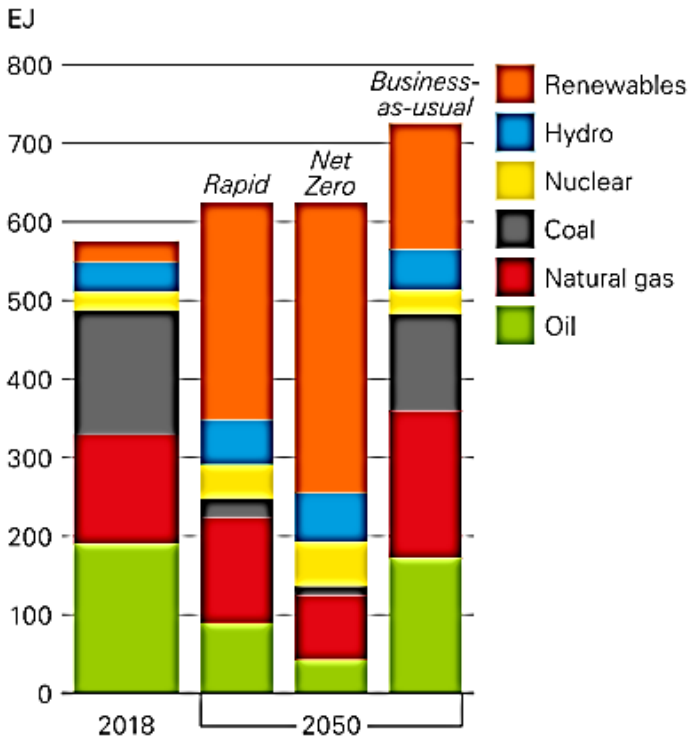
2050 a wide range of future energy options

- ***The transformation of the global energy landscape***
  - Growth in non-fossil energy regardless of scenario
  - Decrease in global oil demand
  - Dramatic growth in demand for renewables even in business as usual case.

Primary energy consumption by source



Source: BP Energy Outlook 2020 edition, pg. 65

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The Changing Global Energy Landscape: China

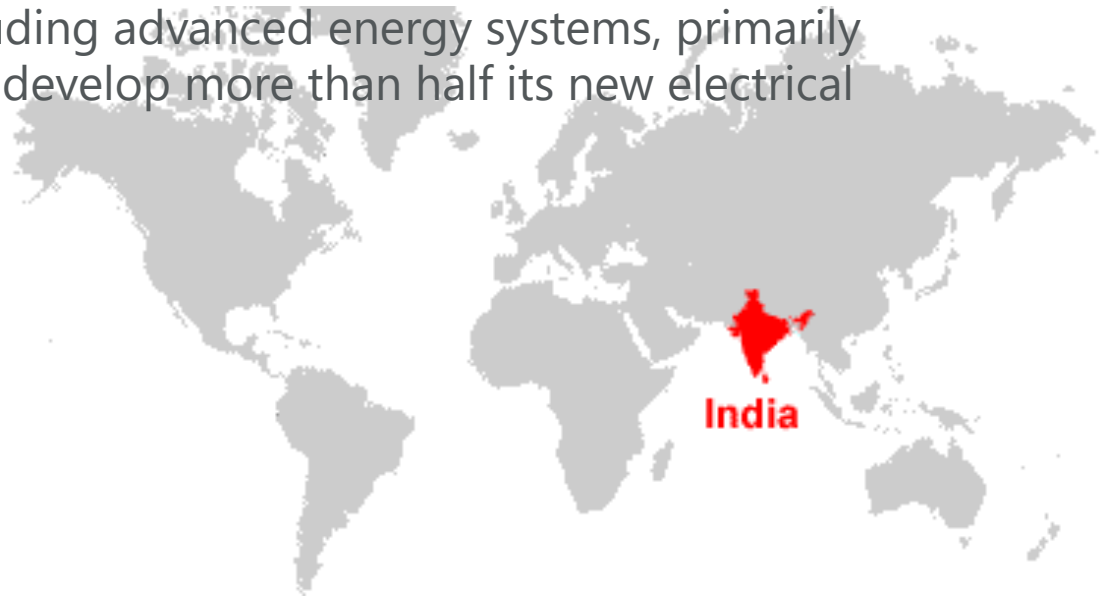
- China's growing energy demand will continue **to exceed its ability to meet needs internally, resulting in more oil and natural gas imports.**
- China's **investment in advanced energy systems AND fossil fuel resources** around the world, especially in developing nations, will tie these nations to China diplomatically and economically.
- China's projects in Latin America, Africa, and South Asia—are targeted to **secure power for its long-run energy needs and to expand its global influence**.

The Changing Global Energy Landscape: Russia

- Russia is the **world's fourth largest energy producer AND consumer**, although it accounts for a mere 1.87 percent of the world's population and just 3.09 percent of the world's GDP.
- Hydrocarbons fuel the Russian **economy—oil and gas are the majority of Russia's exports.**
- Russia has shown **little interest in advanced energy investment** other than nuclear and hydro power.
- Russia is **strategically investing in oil and natural gas markets** in the two fastest growing energy markets in the world: China and India

The Changing Global Energy Landscape: India

- India is the world's third largest oil importer behind China and the U.S., historically **importing over 90 percent of its oil supply from OPEC nations.**
  - Oil meets roughly a third of India's demand for energy to power its industry, transportation, households, services, and agricultural sector.
  - Coal and biomass (wood or charcoal, animal waste, trash.) round out the balance, making India rival China for "the world's poorest air quality."
- India is seeking to meet more of its **burgeoning energy needs through clean advanced energy systems.**
  - India has already set goals aimed at adopting renewable and more energy efficient technologies—including advanced energy systems, primarily solar, wind, and nuclear—to develop more than half its new electrical capacity by 2040.



The Changing Global Energy Landscape: Africa

- With low per-capita energy consumption and high fossil fuel endowment across major areas, Africa is a net exporter of oil, significantly to Europe, India, and the U.S.
- Africa's emerging economies rely heavily on biomass (wood, grass, and charcoal) for energy.
- With population growth, over-dependence on charcoal will be unsustainable.

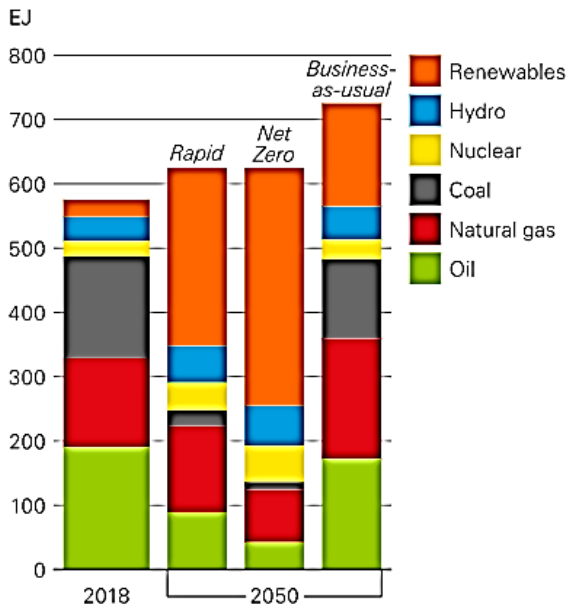
The Changing Global Energy Landscape: Africa (and China)

- If Africa accelerates its advanced energy transition by embracing advanced energy systems, it could skip many of the pitfalls of fossil fuel reliance and realize several internal benefits.
  - **Bring electricity to millions more people more quickly,** potentially leapfrogging over the need to develop a full fossil fuel infrastructure.
  - **Increase productivity**, correct the artificially high cost of doing business, and increase GDP.
  - **Accelerate the opening of new markets** for goods and services, an economic opportunity not only for Africa but also for its trading partners.
- **China has financed $6.7 billion in dams;** together with other renewable projects is responsible for **30 percent of the sub-Saharan African energy capacity.**
- One week after taking office, Chinese President **Xi Jinping promised more than $20 billion in loans** for African infrastructure, including energy.
- Significant potential for **diplomatic tethers** with estimates run as high as $3 trillion for necessary energy investment by 2040 in sub-Saharan Africa alone.

What does this mean for our security?

- Our allies and adversaries are making large scale international **investments in both advanced energy and fossil fuel.**
- The **exponential increase in demand for renewables** presents both an economic and diplomatic opportunity for the U.S.
- Unconventional **oil and gas do not provide long term economic or energy security.**
- **We are falling behind.**

Primary energy consumption by source



Source: BP Energy Outlook 2020 edition, pg. 65

How to leverage the global energy transition to our advantage

- The role we play in the transition will determine our:
  - Global competitiveness
  - Diplomatic standing
  - National security for **decades** to come.
- U.S. investment and leadership will yield direct national and economic security benefits:
  - Opportunities for the United States to **maintain competitive advantage**.
  - The opportunity to lead in the advanced energy marketplace, **creating jobs and economic growth.**
  - **Strengthening our diplomatic influence** with allies and partners around the world who leverage our energy technologies.
- **Ceding U.S. leadership has grave national security risks:**
  - Diminished global influence and diplomatic leverage
  - Missed economic opportunities
  - Technological vulnerabilities

Moving Our Nation Toward the Advanced Energy Future

- Innovative partnerships and investment are required, now
  - Increased emphasis on energy efficiency
  - Research, development and deployment of new technologies
  - Training and employment programs for displaced workers and families of fossil industries
  - Assist other nations in benefitting from the transition.
- The American military must transition also
  - Benefit from energy advances
  - Perhaps demonstrate technological examples
  - But … **mission first, always**

  - **My friend Tom Morehouse will take over here ….**

DoD Needs Resilient Energy

- Installations missions evolving – 24/7 operations, no sanctuary
- Dependent on the national grid for 98% of electricity
- Operational forces facing increasing demands and more hostile environment
  - Moving fuel is expensive, in dollars, operational capacity and lives
- Strong push by DoD to improve energy resilience
  - Funding: New sources to improve energy infrastructure resilience
  - Policy: New mandates issued to improve backup power for critical functions
  - Technology: R&D investments are increasing to improve energy resilience and efficiency, and technology deployment
  - Interagency collaboration: Renewed interest in strengthening collaboration to address national grid vulnerabilities

Improving Resilience By Reducing Carbon

- Current policy supports three options
  - Upgrade energy system inside the fence: local microgrids using renewables, storage, load management, intelligent controls to power critical missions when the grid goes down.
  - Work with local utilities to identify weakness in the local grid and where needed request DoD funding to add storage and other resilience measures
  - Work with DoE's Defense Critical Energy Infrastructure (DCEI) program and transmission utilities to host utility-scale storage on DoD installations to:
    - provide resilient power to national security missions tied to the grid
    - enable the grid to support greater amounts of wind and solar.

Emerging No/Low Carbon Resilient Technologies

- Solar
  - Ga-As cells
  - perovskites
- Storage
- Micro-reactors
- Cellulosic biomass fuels
- Green hydrogen
- Green methane
- Power electronics
- Intelligent control algorithms
- Cyber protection
- Energy efficiency

Roles for DoD

- Focus on continually improving mission capability, readiness and resilience
- Continue aggressive cooperation with DoE, other agencies, the private sector and academia to:
  - produce innovations that meet DoD needs - they will also find important market applications
  - identify and adopt commercial innovations that improve DoD's capability to operate
  - be the high value, early adopter for energy technologies that address military needs and share the results with others
- Incorporate best energy technologies and practices into security cooperation programs to support partner and allied nations

What's happening in Nevada?

- Nevada: Economic Recovery and Energy Infrastructure Investments Can Be Clean and Innovative.
  - **Stimulus investments in renewable energy, storage, and diversified transmission** will strengthen the state and national security.
- **Unconventional oil and gas development does not provide long term energy security for the state or for the nation.**
  - Nevada imports all its natural gas.
  - Governor Sisolak's climate strategy calls for **transitioning away from methane (natural) gas,** requiring new homes to support all-electric appliances and giving customers more opportunities to choose between methane gas and electricity in existing homes.

Again, what's happening in Nevada?

- Nevada should focus on increasing its deployment of—and even exporting—its own homegrown renewable resources instead of depending on imported fossil fuels.
  - Nevada currently generates 66% of its energy from methane gas (natural gas), 22% from renewables, and 4.7% from hydroelectric. As Nevada does not produce methane gas, this means **the state is importing 86% of its energy, when instead the state could focus on increasing its deployment of and even exporting its own homegrown renewable resources like solar and geothermal.**
- Public-private partnerships provide economic and national security benefits.
  - The **Nellis Solar Array (a public-private partnership)** has reduced the base's carbon dioxide emissions by 24,000 tons a year and saved the Air Force $1 million a year in energy costs.

Workforce Benefits Also

- Investment in renewable energy has direct benefits to the Nevada workforce
  - Workers in renewable energy, energy efficiency, grid modernization and storage, clean fuels and clean vehicles **earned a median hourly wage of $23.89 in 2019** compared with the **national median wage of $19.14.**
  - **Clean energy industries also employed about three times more workers than fossil fuels did in 2019**, and, unlike fossil fuel jobs, clean energy **jobs are available in every state**, regardless of geology or geography.
- Energy workers must be helped to transition too
  - New energy jobs increasing, fossil jobs already disappearing
  - Talent must not be lost
  - Opportunity must be provided
  - Transition of people is vital to transition of energy!

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