

# Japan's Leadership Role in Nuclear Safety, Security, Safeguards, and Related Issues in the World

Charles D. FERGUSON, Ph.D.

President, Federation of American Scientists

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Natural Resources and Energy

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# Mission: To Protect the Global Village

- Interdependence: The world needs Japan, and Japan needs the world.
- *Example of Japanese Aid to Jordan for Water Monitoring Stations:*



Photos by C.D. Ferguson, travel to Jordan, June 2012

# Alternative Global Future Without Japan's Leadership and Commitment

- Risk of becoming lawless; low or no standards; overrun by “bandits”



# Preferred Future: Principle-Centered Leadership

- 1 Make safety the top priority.
- 2 Provide layers of safety oversight for proper controls because nothing is risk free.
- 3 Promote nonproliferation to help keep global peace.
- 4 Combat climate change.
- 5 Enhance energy security.
- 6 Maintain economic competitiveness.
- 7 Help emerging countries.



## THE SEVEN VIRTUES OF BUSHIDO

義	礼	勇	名	仁	真	忠
GI	REI	YU	MEIYO	JIN	MAKOTO	CHU
Integrity	Respect	Hesitant Courage	Honor	Compassion	Honesty and Sincerity	Duty and Loyalty
Be utterly honest throughout your dealings with all people. Believe in justice, not from other people, but from your self. To the true warrior, all issues of view are deeply considered regarding honesty, justice and integrity.	True warriors have no reason to be afraid. They do not need to prove their strength. Warriors are courteous even to their enemies. Warriors are not only respected for their strength in battle, but also by their dealings with others.	Hiding like a turtle is a shell is not living at all. A true warrior must have heroic courage. It is absolutely right. It is living life completely, fully, and wonderfully.	Warriors have only one judge of honor and themselves, and this is themselves. Decisions they make and how these decisions are carried out is a reflection of whom they truly are.	Through intense training and hard work the true warrior becomes quick and strong. They are not so great people. They develop a power that must be used for good. They have compassion. They help their fellow men at every opportunity.	When warriors say that they will perform an action, it is as good as done. Nothing will stop them from completing what they say they will do. They do not have to "give their word." They do not have to "promise."	Warriors are responsible for everything that they have done and everything that they have said, and all of the consequences that follow. They are immensely loyal to all of those in their care.
Warriors make a full commitment to their decisions.	The true strength of a warrior becomes apparent during difficult times.	Heroic courage is not blind. It is intelligent and strong.	You cannot hide from yourself.	If an opportunity does not arise, they go out of their way to find one.	Speaking and doing are the same action.	To everyone that they are responsible for, they maintain loyalty first.



# 1. Safety as Top Priority

- Mansfield-FAS-Sasakawa Peace Foundation's 2013 report emphasized, *"the wellbeing of those [people] affected by the Fukushima accident must remain paramount."*
- Expedite decommissioning and decontamination at Fukushima Daiichi and the surrounding prefecture: need for multinational approach
- Work with regional and global partners to find solutions for irradiated fuel and nuclear waste management



## 2. Nothing is Risk Free: Need for Layers of Safety Oversight

- Dispel the “safety myth”
- Ensure that the public has credible information and has an important voice: especially through local governments and Diet members
- Focus on building up strong, independent regulatory agency: Japan is making progress with recent creation of Nuclear Regulation Authority (NRA)
- Make sure that the Diet has adequate capacity to provide oversight of NRA and industry: U.S. Congress as a role model
- Use peer review for industry to improve safety and performance
  - JANSI can learn from U.S.-based Institute for Nuclear Power Operations (INPO)
  - INPO evaluates and rates each U.S. nuclear plant and requires strong commitments from CEOs and operators at each plant for creating and applying effective safety methods.
  - Safer plants are usually higher performing plants.



# Regional Nuclear Safety Concerns

- If Japan exits domestic use of nuclear energy, it will have little or no influence on safety practices in China and the Republic of Korea as well as others in East Asia.
- China and Korea are committed to keep operating and building nuclear plants.



대한민국 원자력 발전소의 입지

한국 전력 통계(한국 전력 공사, 20



### 3. Nonproliferation, Safeguards, and Nuclear Security:

#### Japan has been a Global Leader

- 1959: Japan applied first international safeguards agreement for a research reactor and its fuel
- Late 1970s: Japan devoted reprocessing facility at Tokai-mura to be “safeguards laboratory” to create advanced methods.
- 1980s and beyond: Japan demonstrates its special status as non-nuclear weapon state with both enrichment and reprocessing (ENR) technologies: in 1988 agreement with the U.S., Japan obtains advance consent for ENR activities → Trust in Japan
- 1999: Japan becomes first major nuclear energy nation to apply the Additional Protocol: enhanced safeguards system
- 2000s and beyond: Japan hosts workshops to encourage universal application of the Additional Protocol and makes it a requirement for Japan’s nuclear cooperation agreements
- 2010: Japan began the Integrated Support Center for Nuclear Non-Proliferation and Nuclear Security: This is a center of excellence.



# Japan Risks Losing Leadership in Nonproliferation

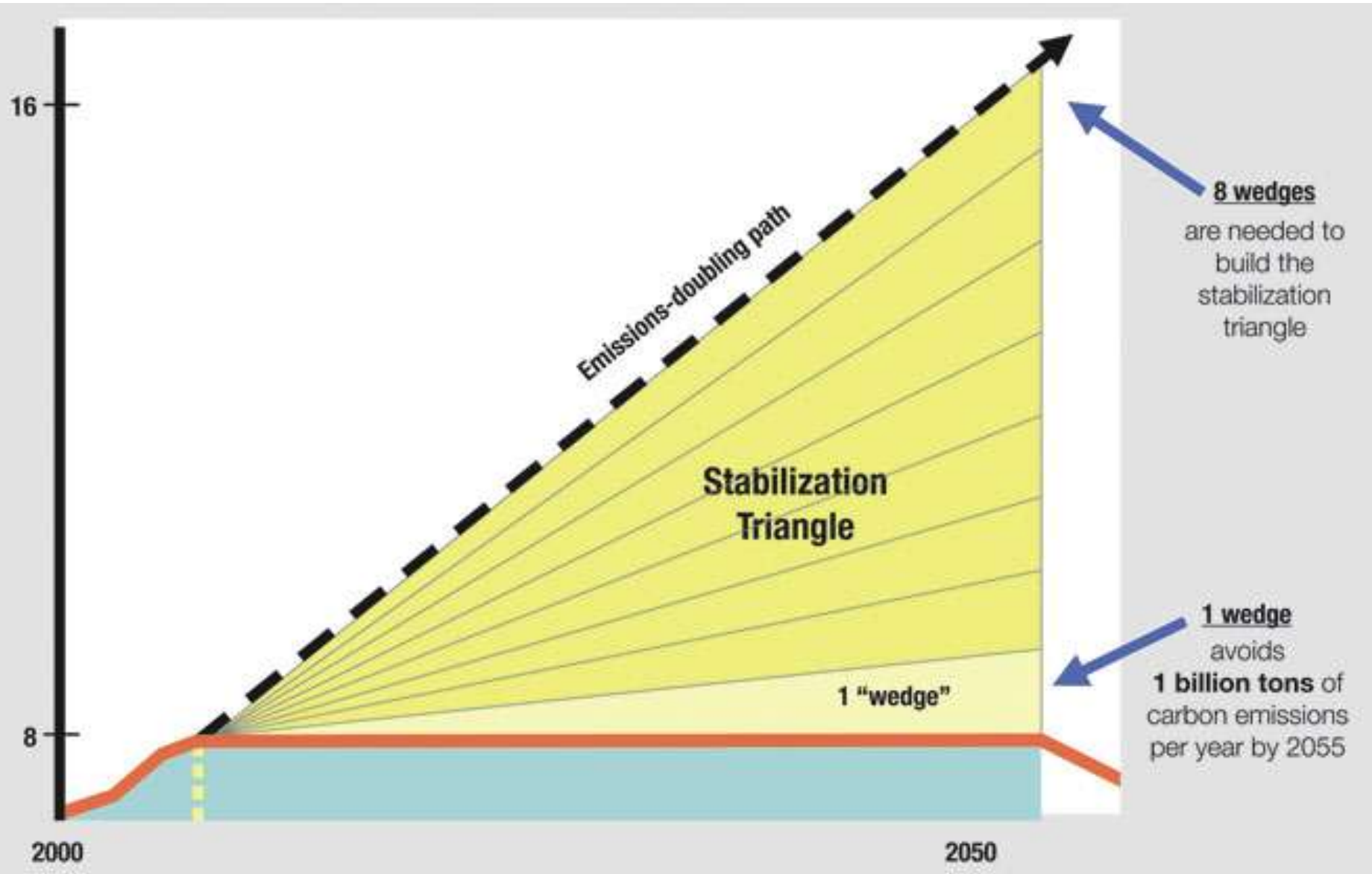
- If Japan exits domestic use of nuclear energy, it will have much less influence on other countries' nonproliferation and security practices.
- A world with weaker nonproliferation and nuclear security standards will harm Japan and other countries.
- Need to support current leaders and encourage next generation of leaders.



## 4. Combat Climate Change

- Japan has served as a role model for efficient use of energy and reduction of greenhouse gases.
- But its leadership is at risk due to increase in greenhouse gas emissions.
- According to the non-governmental organization Global Carbon Project, world emissions increased by 2.3% over past year.
- China and the U.S. are biggest emitters.
- Japan's emissions also have gone up because of increased use of fossil fuels for electrical power generation.

# Technologies that can Stabilize Greenhouse Gas Emissions

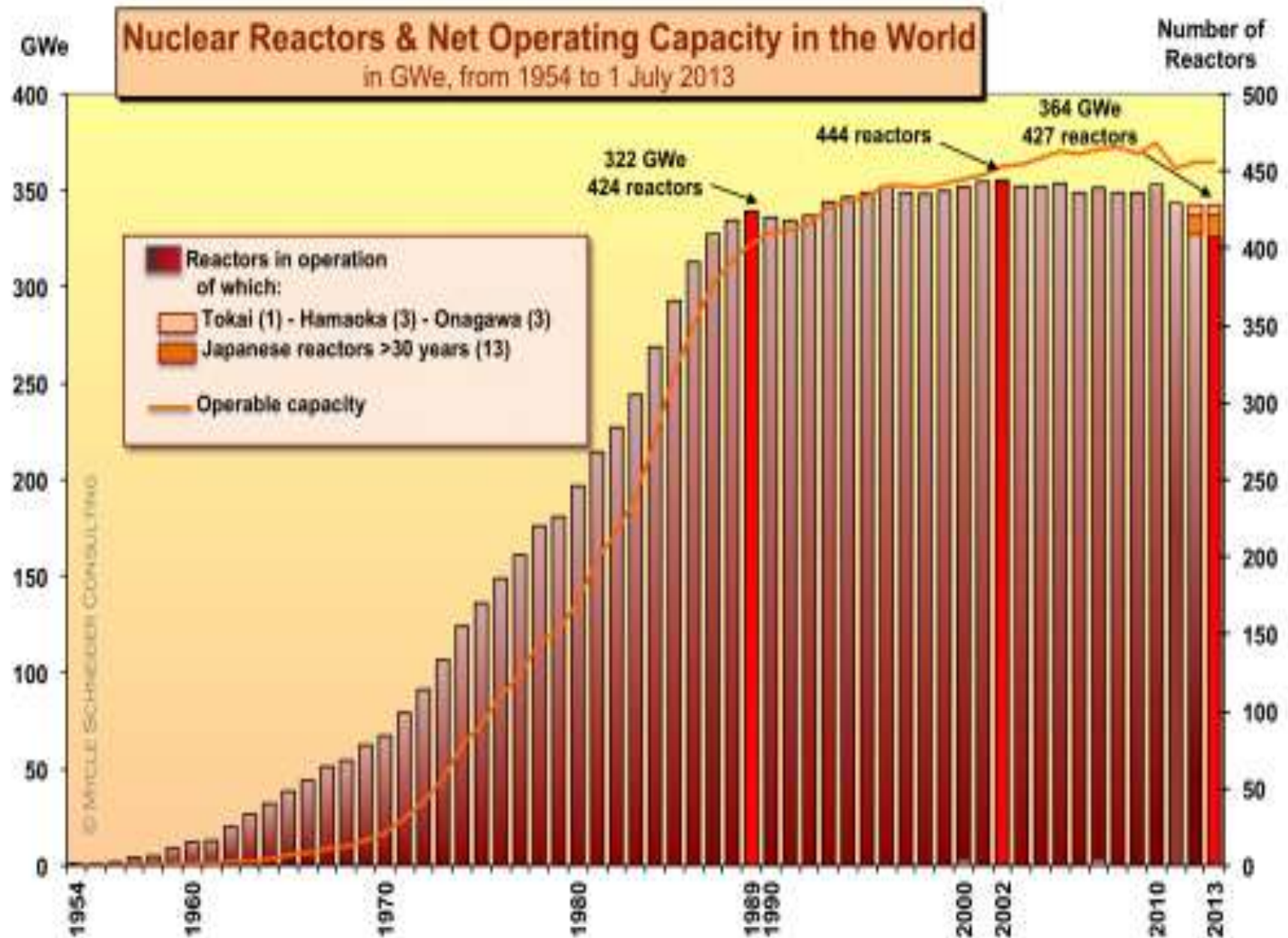


Source: S. Pacala and R. Socolow, *Science*, August 14, 2004.

# Nuclear Energy's Role in Greenhouse Gas Reductions

- To fill “one wedge” of the stabilization triangle:  
Need at least 1,100 large power reactors of 1,000 MW(e) average power rating by mid-century
- World's approximately 400 existing reactors would have to be replaced because of aging.
- Therefore, need to build 400 replacement reactors plus at least 700 additional large reactors.
- ***One power reactor*** needs to be connected to the grid ***every two weeks*** on average by mid-century.

Can this rate of construction be done? Yes, but very challenging



# 5. Enhance Energy Security

- Need for balanced energy portfolio
- Renewable energies have very important role but it will take a long time for these energies to reach large enough scale to be comparable to fossil fuel sources
- Also need more R&D and investments to develop energy storage for intermittent renewable energies
- Nuclear plant restarts will reduce **excessive** dependency on fossil fuels, especially LNG



Solar panels on Ferguson's house in Washington.



## 6. Economic Competitiveness: Increasing Globalization of Nuclear Industry but Differing Business Models

Offering BWR and PWR, the two mainstream systems in the world



To become the world leader in the nuclear power plant business



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a McDermott company



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# Japan-U.S. Nuclear Energy Partnership

- Provides needed alternative to primarily state-owned or dominated nuclear companies in China, France, Korea, and Russia
- Without Japan, the United States would not now be building new AP1000 reactors in Georgia and South Carolina



Ferguson's photo of Vogtle Nuclear Power Plant in Georgia in which Toshiba has supplied electrical generation equipment for new reactors under construction.

## 7. Help Countries Wanting Nuclear Energy

- Many countries are seeking their first nuclear power plants: for example, Indonesia, Jordan, Saudi Arabia, Thailand, Turkey, and Vietnam
- Who will supply the plants and the necessary services such as operation instructions, safety training, fuel, waste management, etc.?
- Korea won recent nuclear deal with the UAE in part because the ROK offered a package of services in addition to power plant construction.
- ***Lead by example: The ROK promised the UAE that it would build the first type of these plants in Korea ahead of the UAE construction.***
- Japan has opportunity to apply lessons learned from its experiences to help other countries be better prepared for safer operation of nuclear power plants. ***Japanese domestic nuclear energy use speaks clearly to other countries.***

# Revitalizing Japan's Leadership Role in Nuclear Energy and Global Affairs



Eclipses are temporary.



Rising suns are forever.

Slides in Japanese

世界の原子力安全、核セキュリティ、  
核不拡散・保障措置に関する  
日本の主導的役割

チャールズ D. ファーガソン博士  
米国科学者連盟(FAS)理事長

総合資源エネルギー調査会における講演  
2014年10月2日



# 使命:「地球村」を守ること

- 相互依存関係とは:世界は日本を必要としており、日本は世界を必要としている
- ヨルダンでの水のモニタリング装置に関する日本の支援の例



Photos by C.D. Ferguson, travel to Jordan, June 2012

# 日本のリーダーシップとコミットメントがない もう一つの世界の未来

- 無法になるリスク; 基準がほとんどない; 「山賊」が群がる



# 好ましい未来：原則を中心に据えたリーダーシップ

- 1 安全を最優先にすること。
- 2 リスクのないものはないため、適切なコントロールを行うために幾重にも安全管理を行うこと
- 3 世界の平和を維持するため、核不拡散を推進すること。
- 4 気候変動と戦うこと。
- 5 エネルギーセキュリティを向上させること。
- 6 経済競争力を保つこと。
- 7 新興国を援助すること。



## THE SEVEN VIRTUES OF BUSHIDO

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So solemnly honest throughout your dealings with all people. Believe in justice, not from other people, but from your self. To the true warrior, all points of view are deeply considered regarding honesty, justice and integrity.	True warriors have no reason to be cruel. They do not need to prove their strength. Warriors are courteous even to their enemies. Warriors are not only respected for their strength in battle, but also for their dealings with others.	Nothing like a hero is a shell is not living at all. A true warrior must have heroic courage. It is absolutely risky. It is living life completely fully, and wonderfully.	Warriors have only one judge of honor and character, and this is themselves. Decisions they make and how these decisions are carried out is a reflection of whom they truly are.	Through intense training and hard work, the true warrior becomes quick and strong. They are not on most people. They develop a power that must be used for good. They have compassion. They help their fellow men at every opportunity.	When warriors say that they will perform an action, it is as good as done. Nothing will stop them from completing what they say they will do. They do not have to "give their word." They do not have to "apologize."	Warriors are responsible for everything that they have done and everything that they have said, and all of the consequences that follow. They are immensely loyal to all of those in their circle.
Warriors make a full commitment to their decisions.	The true strength of a warrior becomes apparent during difficult times.	Heroic courage is not blind. It is intelligent and strong.	You cannot hide from yourself.	If an opportunity does not arise, they go out of their way to find one.	Speaking and doing are the same action.	To everyone that they are responsible for, they remain fiercely true.



# 1. 安全性を最優先にすること

- マンスフィールド財団・米国科学者連盟・笹川平和財団の2013年の報告書は「福島事故により影響を受けた者の幸福は最優先であるべき」と強調した。
- 福島第一原発と周辺地域の廃炉・除染を促進すべき：様々な国のアプローチが必要。
- 使用済燃料と核廃棄物の管理の解決方法を探すため、地域及び様々な国のパートナーと協力すべき。



## 2. リスクのないものはない: 複数の層における安全管理の必要性

- 「安全神話」からの脱却
- 人々が信頼できる情報を有し、重要な意見を提供することを確保すること: 特に地方政府や国会議員を通じて
- 強く独立した規制機関設立に注力すること: 日本は近年の原子力規制委員会の創設により前進
- 国会が原子力規制委員会及び産業界を監視できるだけのキャパシティがあることを確保すること: 米国議会をロールモデルとして
- 安全性とパフォーマンスを改善できるように、業界のピアレビューを活用すること
  - 原子力安全推進協会 (JANSI) は米国の原子力発電運転協会 (INPO) から学ぶことができるだろう。
  - INPOは米国の原発を評価して格付けし、各原発において効果的な安全手法を作ってそれを適用するよう、最高経営責任者 (CEO) から運転員に至るまで強いコミットメントを求める。
  - 通常、より安全な炉はより効率のよい炉でもある。



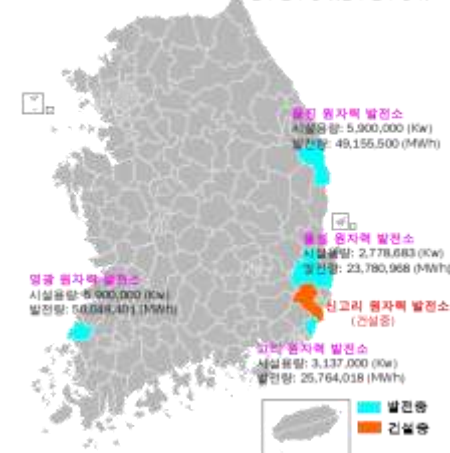
# 地域の原子力安全問題

- もし日本が国内の原子力利用を止めた場合、日本は中国、韓国等の東アジア諸国の安全慣行にほとんど、もしくは全く影響を与えなくなる。
- 中国や韓国は原発の運転・建設を続けることにコミットしている。



대한민국 원자력 발전소의 입지

한국 전력 통계(한국 전력 공사, 2010)





### 3. 核不拡散・保障措置、原子力安全： 日本は世界を主導してきた

- 1959年：日本は研究炉・燃料について、初めて国際保障措置の協定を適用した。
- 1970年代後半：日本は東海村の再処理施設を、より進歩した方法の開発を行う「保障措置の実験所」とした。
- 1980年代以降：日本は非核兵器国の中で濃縮と再処理の両方を行う国として特別な地位にある。：1988年の米国との協定により、日本は濃縮・再処理に関する事前同意を得た。 →日本を信頼
- 1999年：日本は追加議定書を適用する最初の主要核エネルギー国となった。：増強された保障措置
- 2000年代以降：日本は追加議定書への各国の加入を促すワークショップを主催し、それを日本の原子力協定の要求事項とした。
- 2010年：日本は核不拡散・核セキュリティ総合支援センターを設置：中核的研究機関

# 核不拡散においてリーダーシップを失うことの日本のリスク

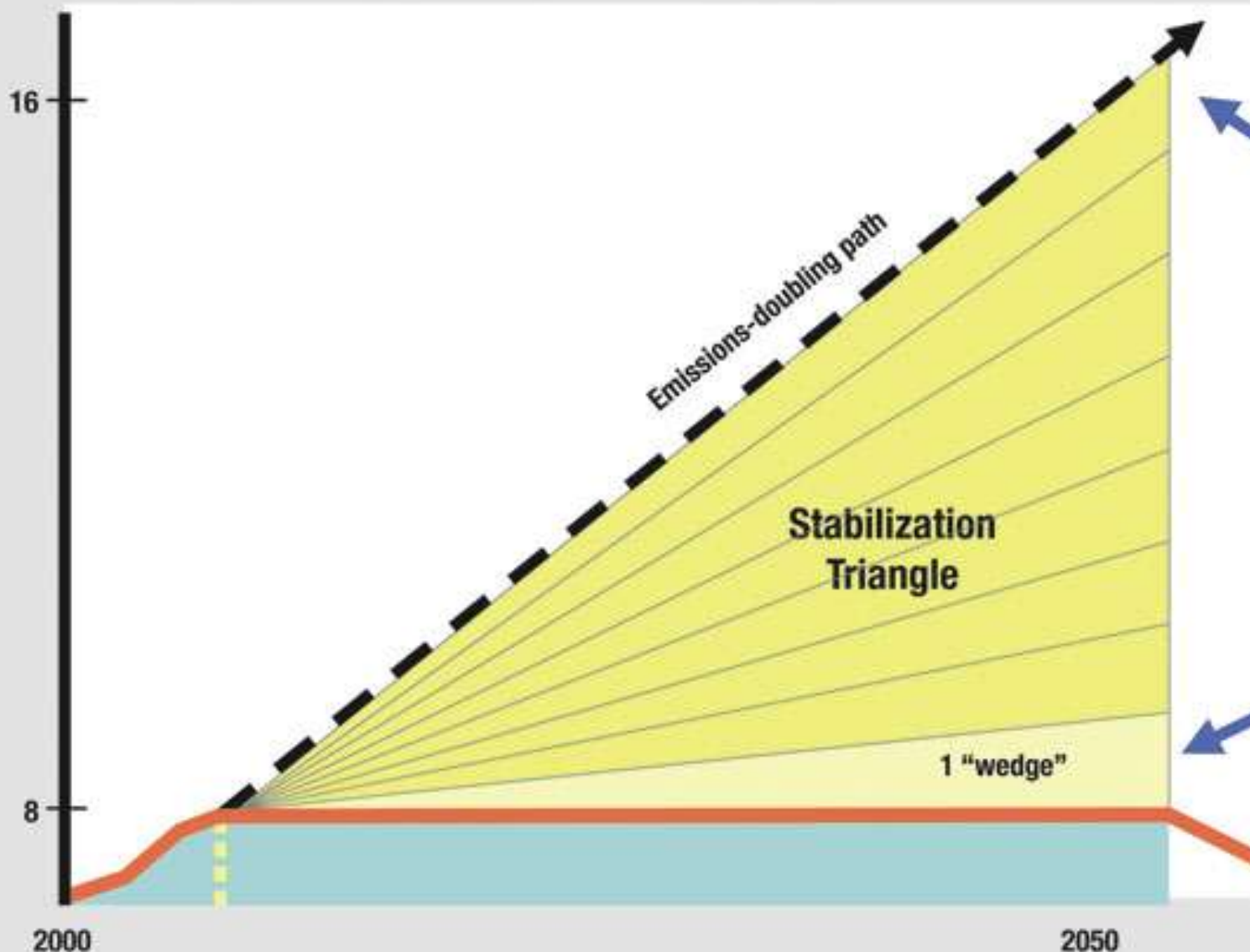
- もし日本が原子力エネルギーの国内利用を止めるのであれば、他国の核不拡散・核セキュリティの慣行に及ぼす影響はより小さくなる。
- 核不拡散及び核セキュリティを弱めることは、日本や他の国にとって悪い影響となるだろう。
- 現在のリーダーを支援し、次世代のリーダーたちを励ますことが必要。



## 4. 気候変動と戦うこと

- 日本は省エネルギー及び温室効果ガス削減のロールモデルとなってきた。
- しかし、温室効果ガスの増加により、そのリーダーシップは危ぶまれている。
- 非政府組織「グローバルカーボンプロジェクト」によると、世界の排出量は昨年に比べ2.3%増加した。
- 中国と米国はもっとも排出量が多い。
- 発電のための化石燃料の使用が増えているため、日本の排出量も増えている。

# 温室効果ガス排出を安定化する技術



安定化のトライアングルは8つの「くさび」から成る。

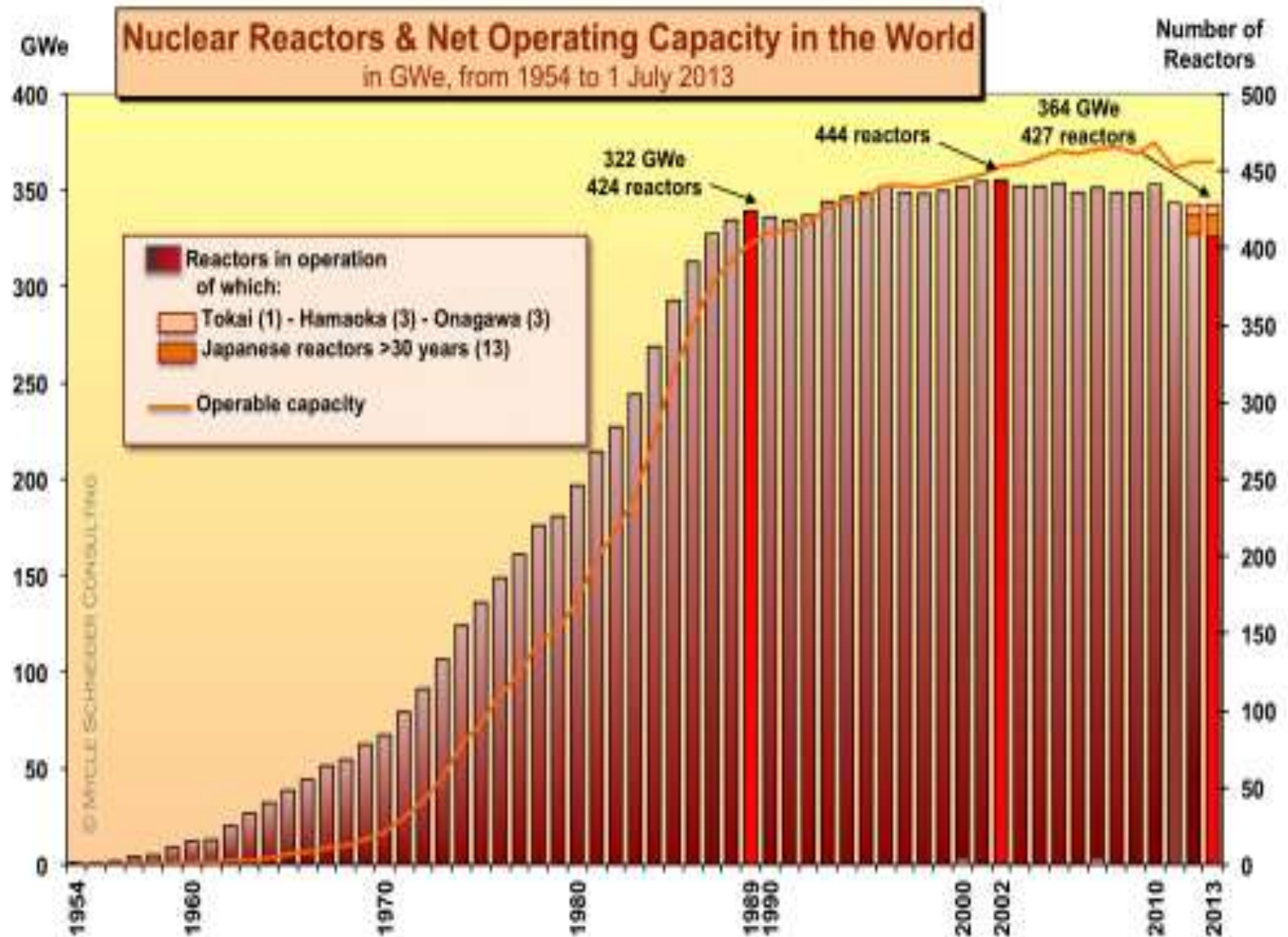
1つの「くさび」  
2055年までに  
毎年10億トンの  
炭素排出を防ぐことができる。

Source: S. Pacala and R. Socolow, *Science*, August 14, 2004.

# 温室効果ガス削減における 原子力エネルギーの役割

- 1つの「くさび」を満たすには：今世紀半ばまでに100万kW級の発電所が少なくとも1,100基求められる。
- 世界にある約400基は老朽化によりリプレイスされなければならない。
- したがって、400基の原子炉リプレイスに加え、少なくとも700基の大規模原子炉を建てる必要がある。
- 今世紀半ばまでに、平均で**2週間に1回**、原子炉を新たにグリッドに接続しなければならない。

このペースの建設は可能か？ 可能であるが、とても挑戦的である





## 5. エネルギーセキュリティを向上させること

- バランスとれたエネルギーのポートフォリオが必要。
- 再生可能エネルギーは非常に重要な役割を有しているが、これらエネルギーが化石燃料と比較可能な規模まで拡大するには長時間かかる。
- また、不安定な再生可能エネルギーのため、エネルギー貯蔵を展開するための更なるR&D及び投資が必要。
- 原発再稼働によって、化石燃料、特にLNGへの**過度な**依存を減らすことができる。



Solar panels on Ferguson's house in Washington.

# 6. 経済的競争力: 原子力産業のグローバル化と異なるビジネスモデル

Offering BWR and PWR, the two mainstream systems in the world



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# 日米エネルギー協力

- 中国、フランス、韓国、ロシアにおける国営の、又は国が支配する原子力関連企業に対して必要な代替する選択肢を与えること。
- 日本がいなければ、米国はジョージア州やサウスカロライナ州に新しいAP1000を建てられないだろう。



Ferguson's photo of Vogtle Nuclear Power Plant in Georgia in which Toshiba has supplied electrical generation equipment for new reactors under construction.

## 7. 原子力が必要な国を援助する

- 多くの国は初めて原発を建てようとしている：例えば、インドネシア、ヨルダン、サウジアラビア、タイ、トルコ、ベトナム
- オペレーションの指導や安全訓練、燃料や廃棄物の管理など必要なサービスを誰が提供するのか？
- 韓国は最近UAEの原発建設契約を勝ち取っているが、これは韓国が建設に加えてサービスをパッケージで提供することを提案したことが理由の一つ。
- **例として：韓国はUAEに対して、UAEで建てる前に韓国で最新の炉を建てることを約束した。**
- 日本は、その経験から学んだ教訓を、各国によるより安全な原発の運営に役立てる機会を有する。**日本の国内の原子力エネルギー利用が他国に明確に物語るであろう。**

# 日本の原子力エネルギーと国際問題 における主導的役割を取り戻す



日食は一時的なもの。



日の出は永遠に。