ISSUES OF ENERGY TECHNOLOGY GOVERNANCE

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1. Need for Technology Assessment

- Technology assessment (TA) refers to institutions and practices which support problem-definition (agenda setting) or decision-making for the development of technology and society by anticipating societal impacts/ implications of emerging technologies
- Technology have many implications (benefits – economic/ security/ environment, risks, and value related judgments) for society- society has to perform an assessment incorporating various implications - framing

  cf. Uncertainty over risks (negative impacts) and benefits

  cf. Distributive implications
- A wide range of actors has come to be involved as a detector in technology governance, in reaction to the numerous social implications of technology in specific societal contexts – need for communication
- Need for distance for opening up scope of discussions as a precondition for decision/ strategy making

  cf. Relations between science advisor and strategy headquarter

2. Unique Nature of Energy Technology Innovation?

- Time horizon – long term investment
- Relationship with security issues – different from normal commodity?
- Social symbol?
- Siting and social acceptance issues
- Importance of regulations and institutions

cf. Decentralized energy system as a part of urban planning

3. Roles of Actors

- Governments

  cf. Nuclear – FBR（高速増殖炉）?
- Research Institutes

  cf. Heat pump – CRIEPI （電中研）in collaboration with manufacturers （デンソー）and utilities（東京電力）

  cf. Universities?
- Private firms

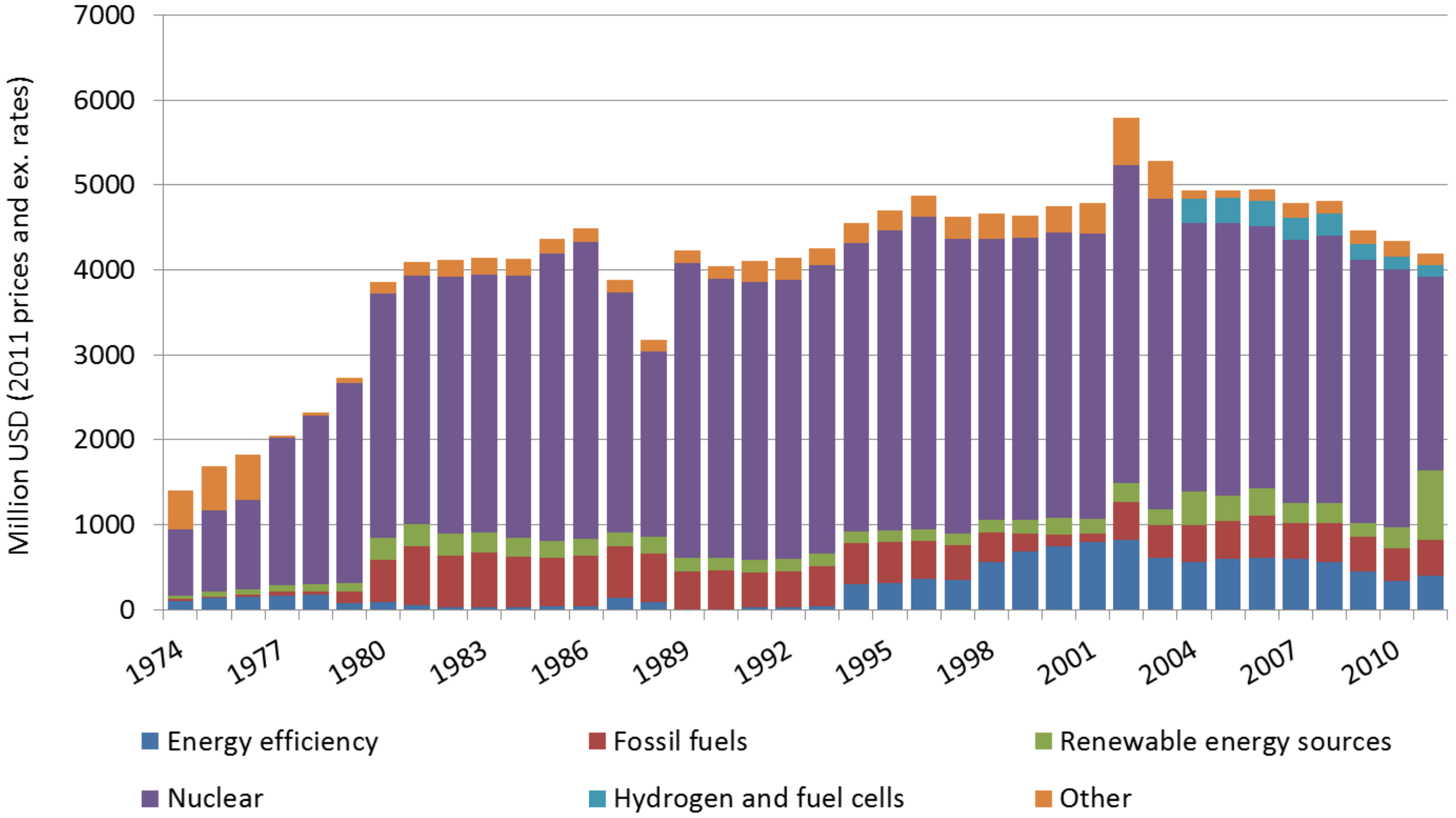
  cf. Natural gas turbine, hybrid cars

4. Roles of Policy Instruments

- R&D funding
- Regulatory support – ex. FIT
- Reforming regulations – institutional infrastructure

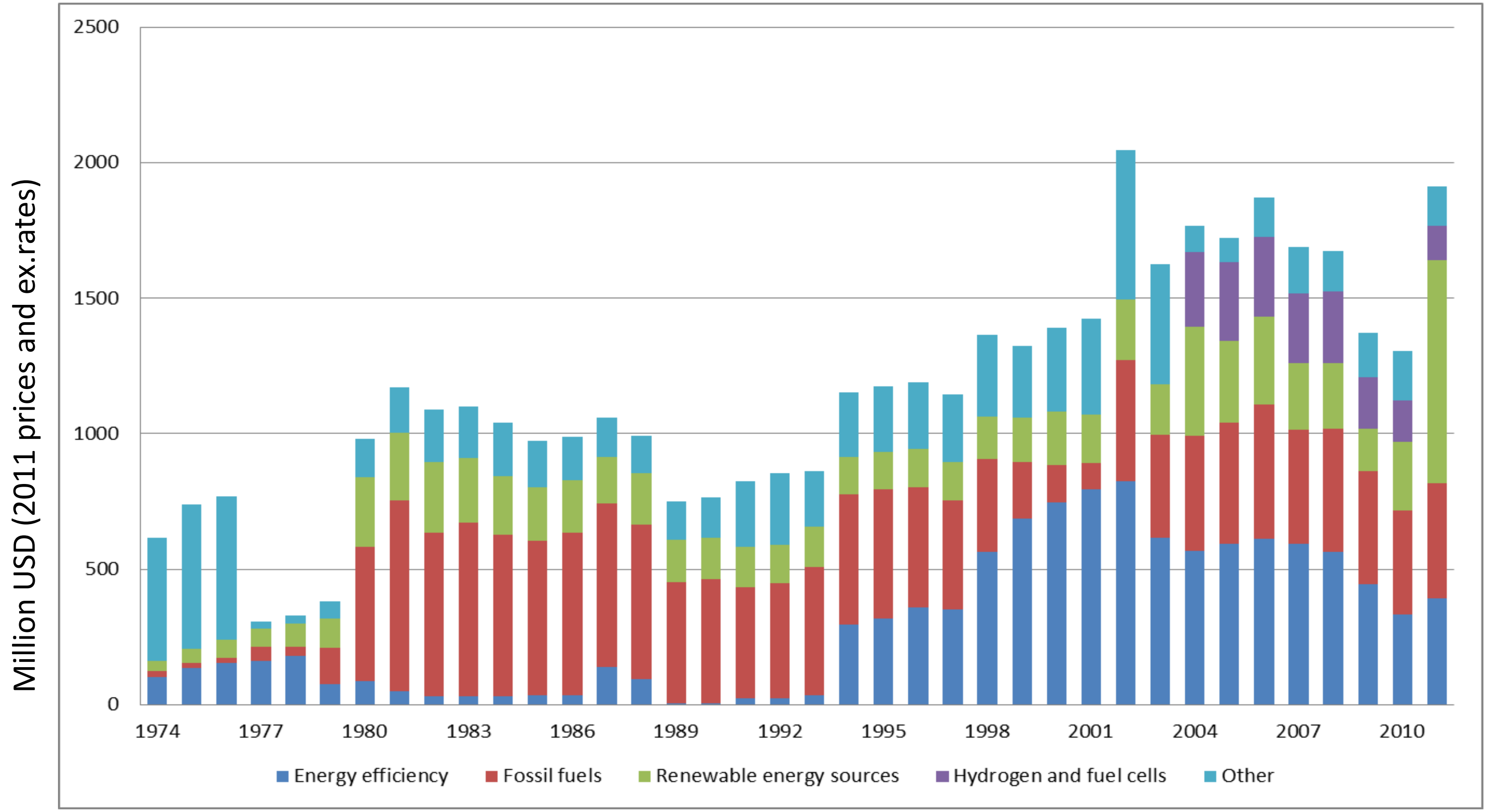
  cf. safety regulation for decentralized energy
- Importance of “Expectation” in market – energy pricing, possibility of regulation

Energy RD&D – Japan



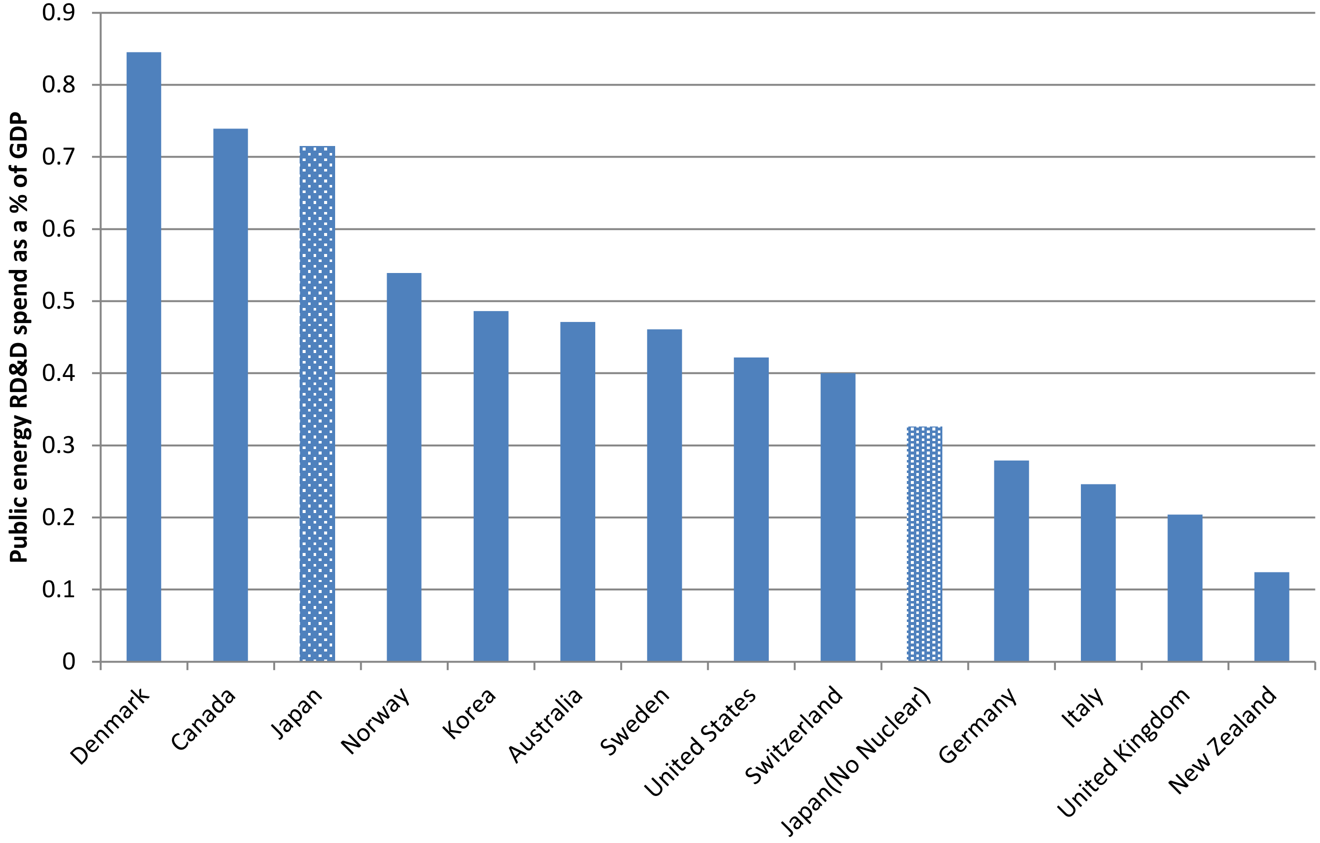
Source: Data from IEA R&D statistics

Energy RD&D – Japan (No Nuclear)



Source: Data from IEA R&D statistics

Energy RD&D relative to GDP (include Japan (No Nuclear))



Source: Data from IEA R&D statistics

5. Examples – multi faceted implications

- Unconventional gas and oil

  cf. Uncertainty about assumption, risks related to mining
- Renewable

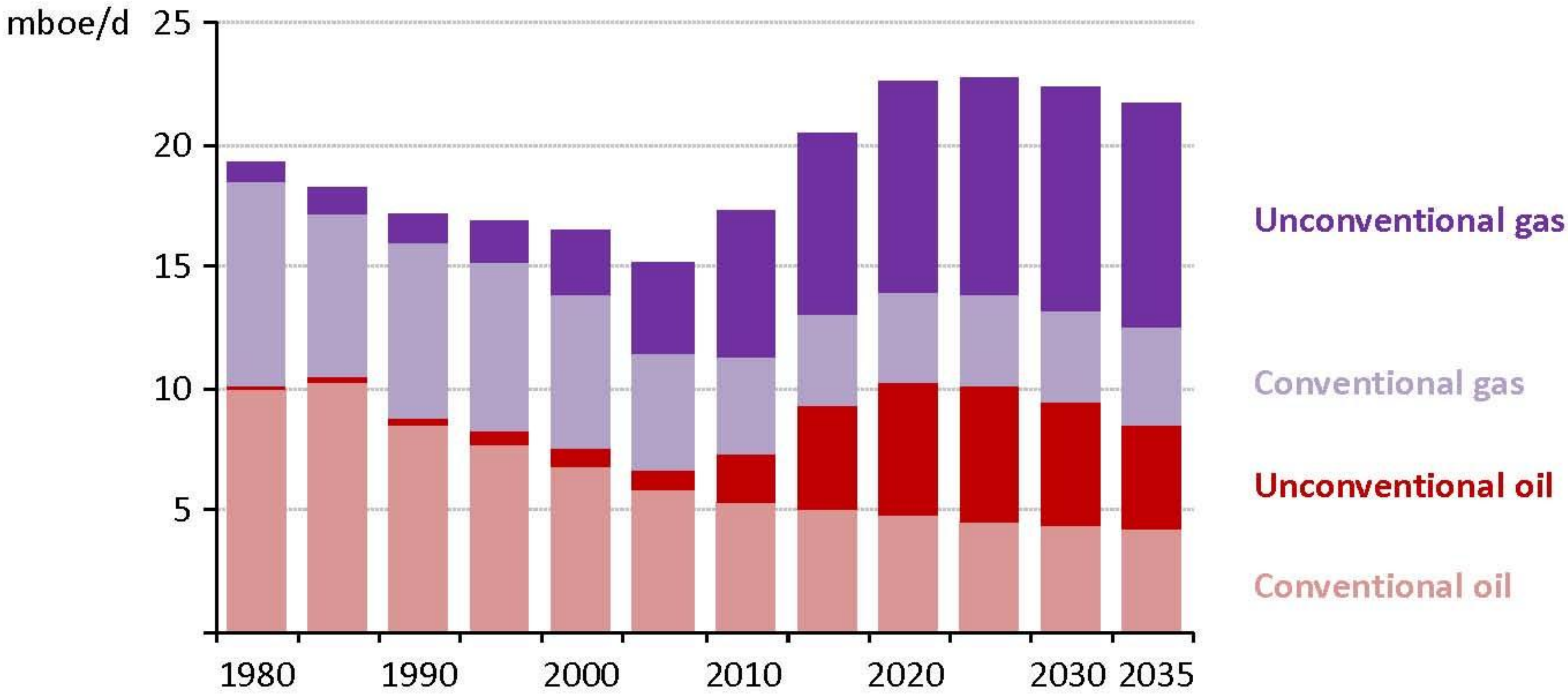
  cf. Fishing rights, urban planning
- Nuclear

  cf. Social acceptance, security implications
- Energy saving

  cf. Importance of climate change regulations at the global level for Japan

A United States oil & gas transformation

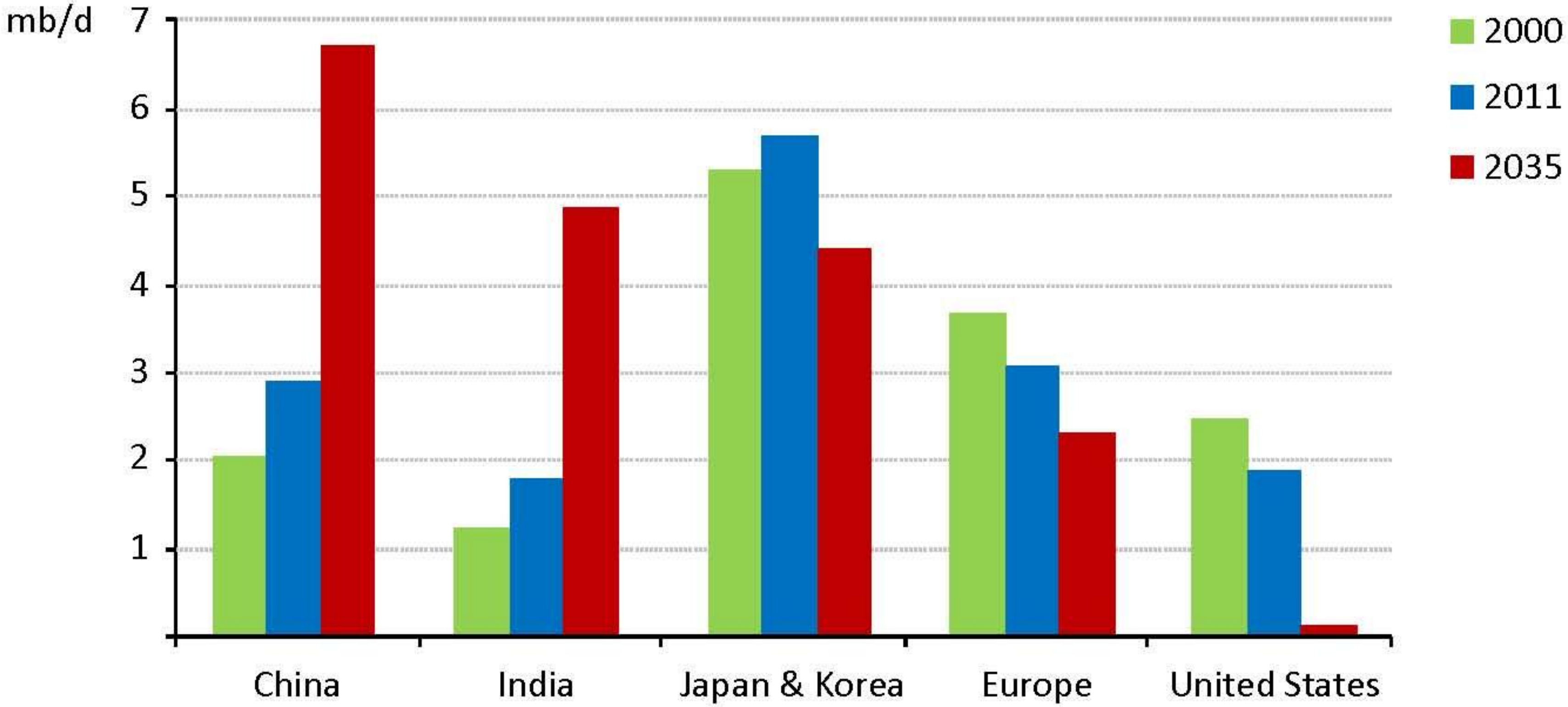
US oil and gas production



The surge in unconventional oil & gas production has implications well beyond the United States

Middle East oil to Asia: a new silk road

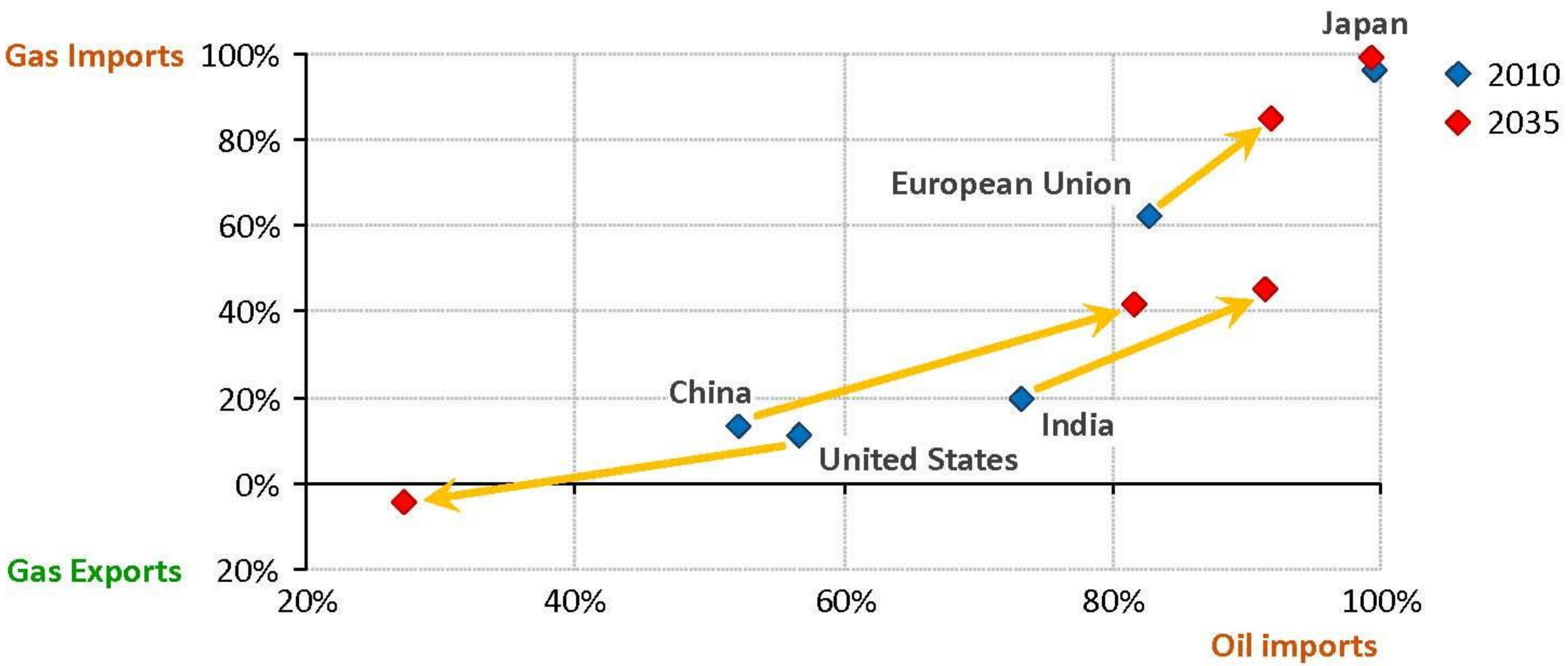
Middle East oil export by destination



By 2035, almost 90% of Middle Eastern oil exports go to Asia; North America's emergence as a net exporter accelerates the eastward shift in trade

Different trends in oil & gas import dependency

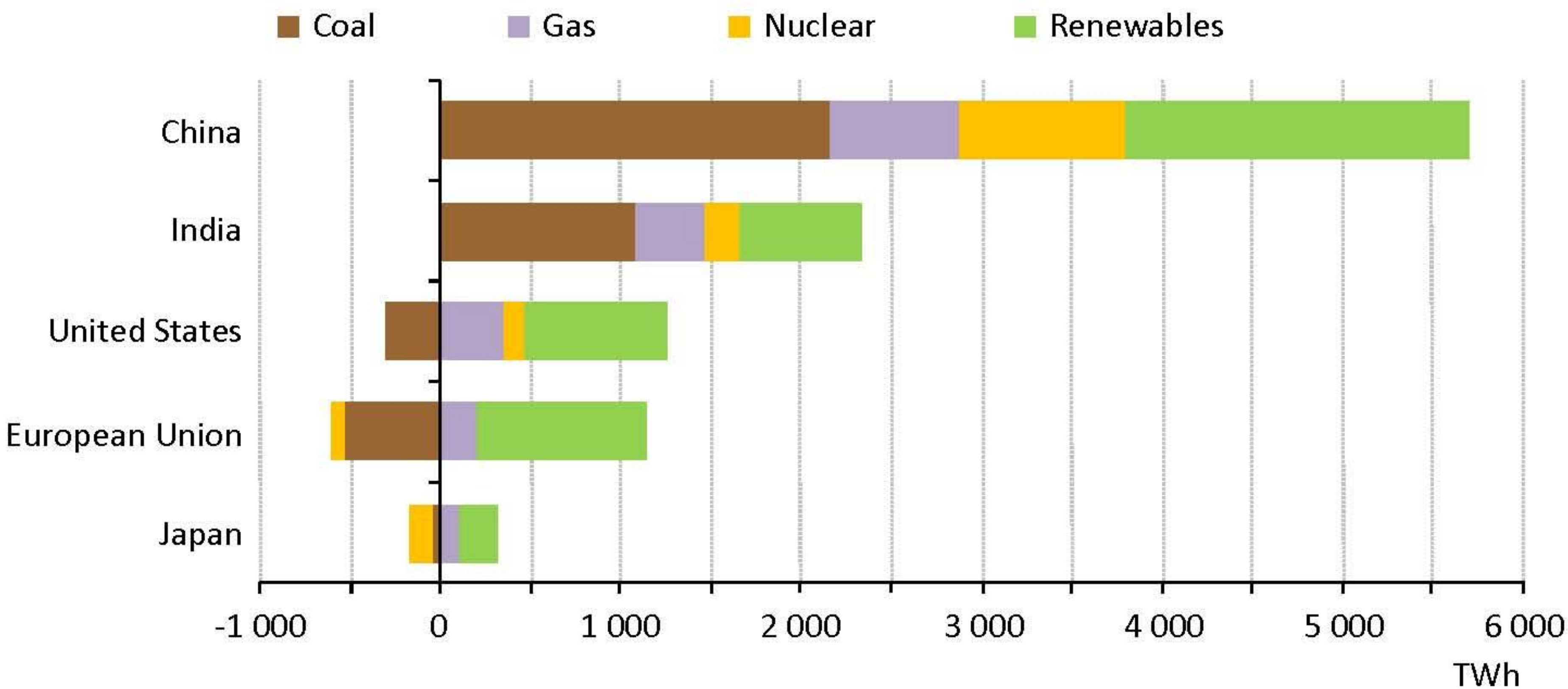
Net oil & gas import dependency in selected countries



While dependence on imported oil & gas rises in many countries, the United States swims against the tide

A power shift to emerging economies

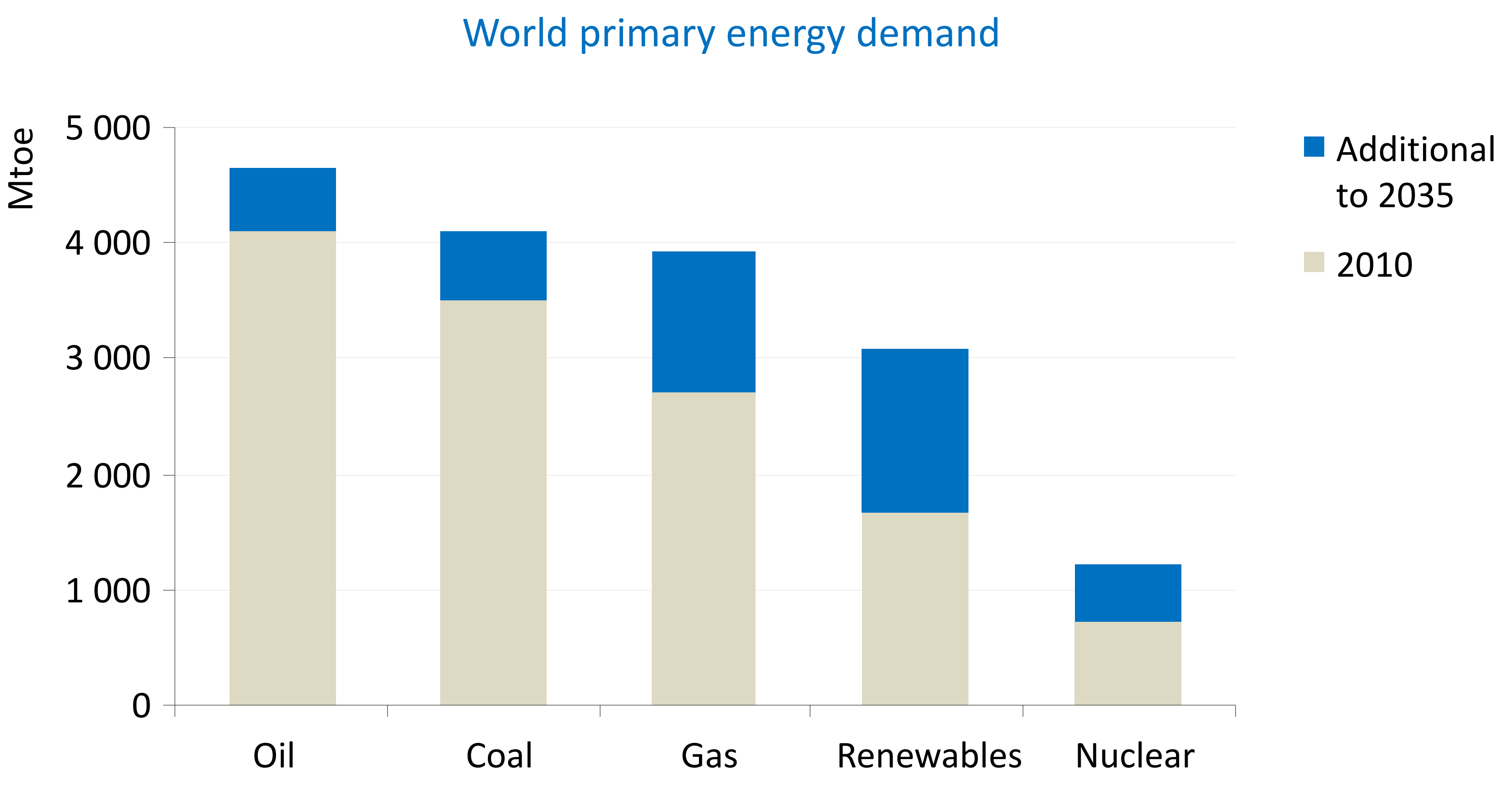
Change in power generation, 2010-2035



The need for electricity in emerging economies drives a 70% increase in worldwide demand, with renewables accounting for half of new global capacity

Renewable

(WEO2010)



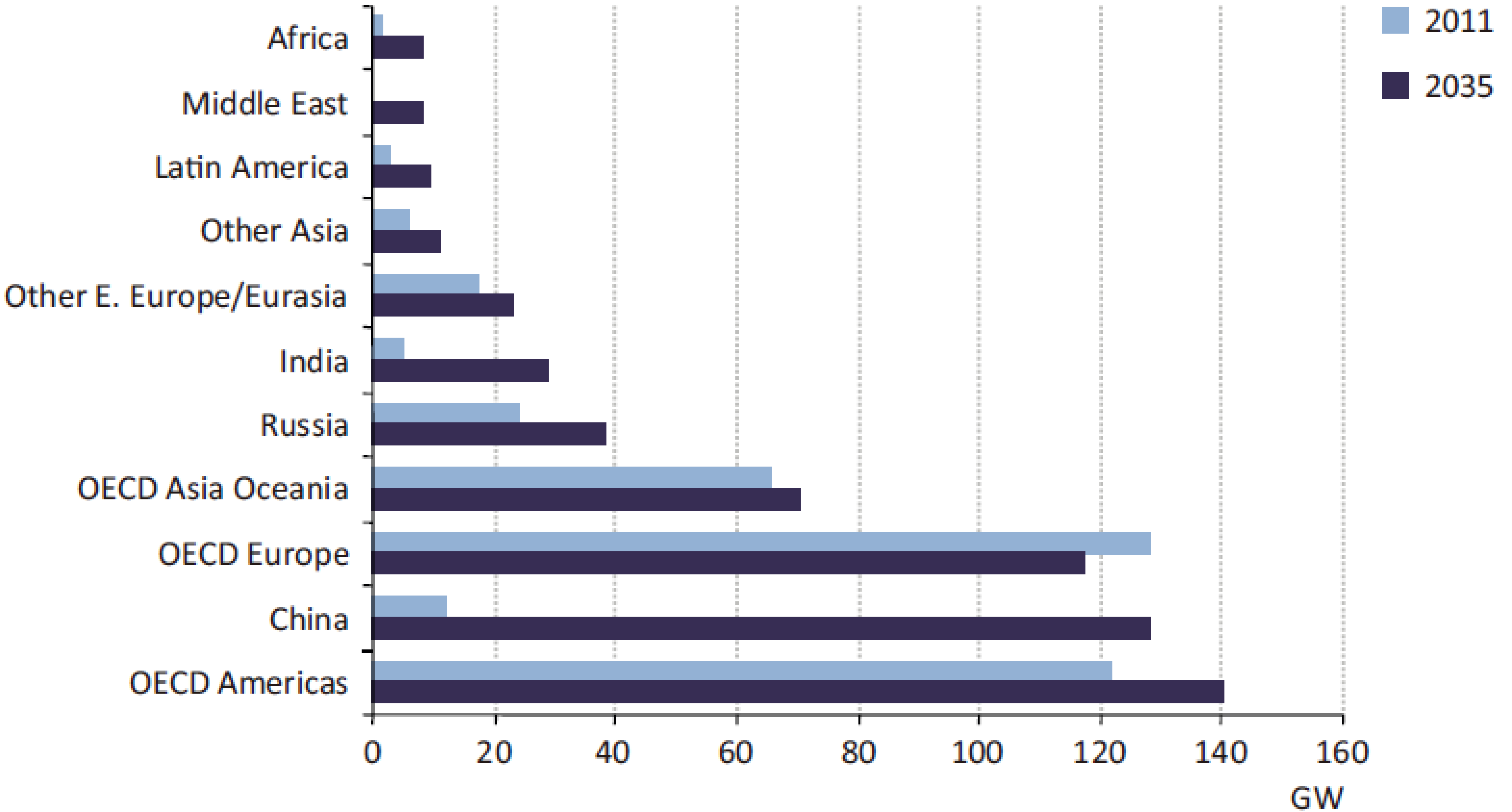
Renewables & natural gas collectively meet almost two-thirds of incremental energy demand in 2010-2035

Security Implications of Japan's Nuclear Policy for US and China

- US: Dependence on Japan concerning nuclear manufacturing capacity - embedded cold war structure?
- Current industrial structure of nuclear industry

  ①Toshiba – WH, ②Hitachi – GE, ③AREVA – MHI, ④Doosan (Korean), ⑤Rosatom (Russian)
- What is common interests among US and Japan? – Short term market in China and long term consequences (unintended transfer of technology)?

Figure 6.7 ▷ Nuclear power capacity by region in the New Policies Scenario



（IEA, WEO2012）

The U.S.-Japan Alliance anchoring stability in Asia (by Armitage, etc. August 2012)

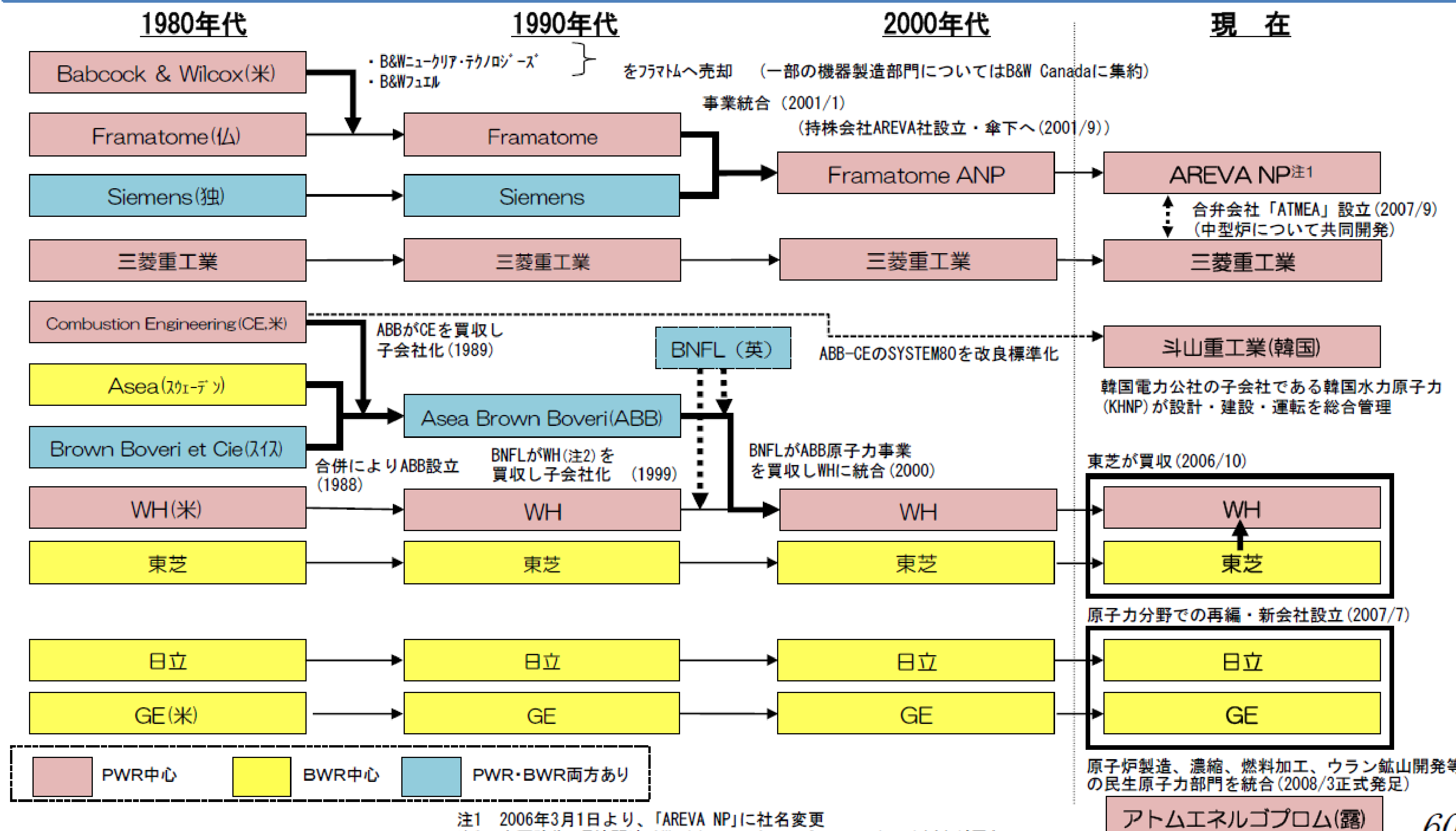
Energy Security
Nuclear Energy

—A permanent shutdown will also stymie responsible international nuclear development, as developing countries will continue to build nuclear reactors. China, which suspended reactor approvals for over a year following Fukushima (but did not suspend progress on ongoing projects), is restarting domestic construction of new projects and could eventually emerge as a significant international vendor. **As China plans to join Russia, South Korea, and France in the major leagues of global development in civilian nuclear power, Japan cannot afford to fall behind if the world is to benefit from efficient, reliable, and safe reactors and nuclear services.**

- For its part, the United States needs to remove uncertainty surrounding disposal of spent nuclear waste and implement clear permitting processes. While we are fully cognizant of the need to learn from Fukushima and implement corrective safeguards, nuclear power still holds tremendous potential in the areas of energy security, economic growth, and environmental benefits. Japan and the United States have common political and commercial interests in promoting safe and reliable civilian nuclear power domestically and internationally. **Tokyo and Washington must revitalize their alliance in this area, taking on board lessons from Fukushima, and resume a leadership role in promoting safe reactor designs and sound regulatory practices globally.** The 3-11 tragedy should not become the basis for a greater economic and environmental decline. Safe, clean, responsibly developed and utilized nuclear power constitutes an essential element in Japan’s comprehensive security. In this regard, U.S.-Japan cooperation on nuclear research and development is essential.

世界の主要原子力プラントメーカー

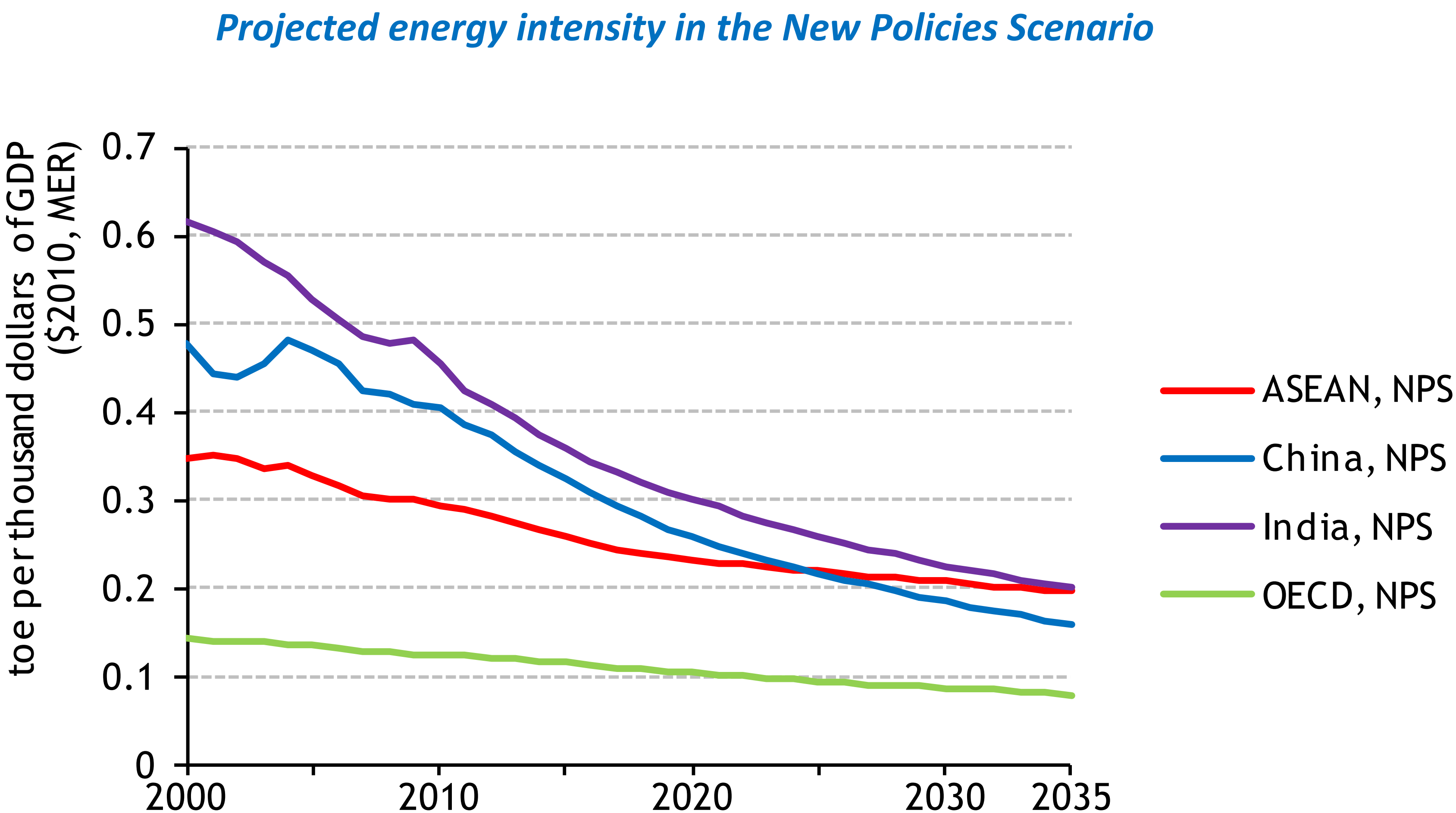
○世界の原子力プラントメーカーは、国際的な再編・集約化を通じて寡占化が進展。
○昨今、競争が激化。日米仏に加え、ロシア、韓国企業が台頭。今後、中国企業も進出してくる可能性。



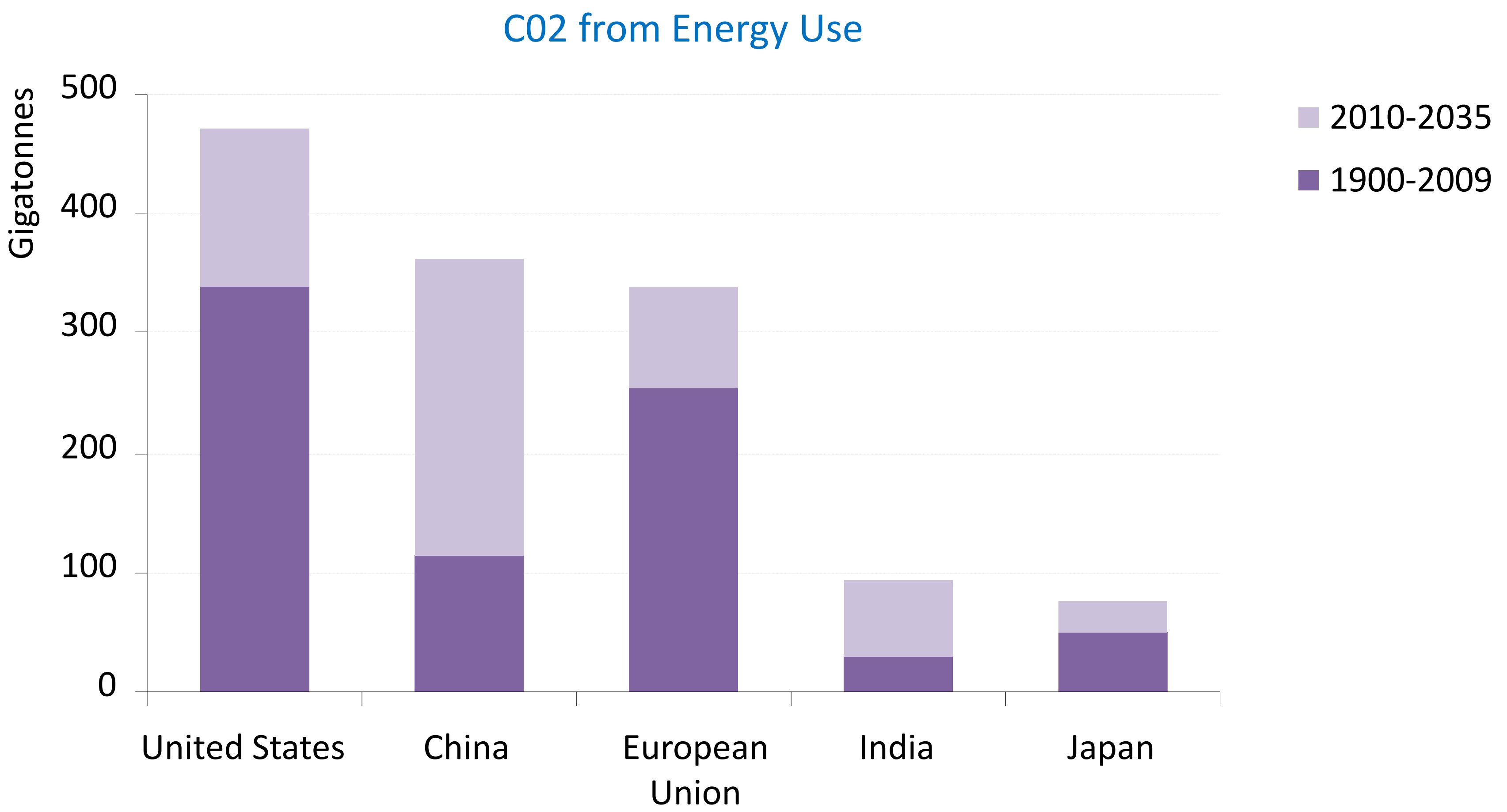
注1　2006年3月1日より、「AREVA NP」に社名変更
注2　米国防衛・環境関連はWashington Group International(米)が買収

（資源エネルギー庁「原子力の現状について」2012年1月）

Asia has large potential for stepping up energy efficiency



CO2 emission from energy use – Global Warming (WEO2011)

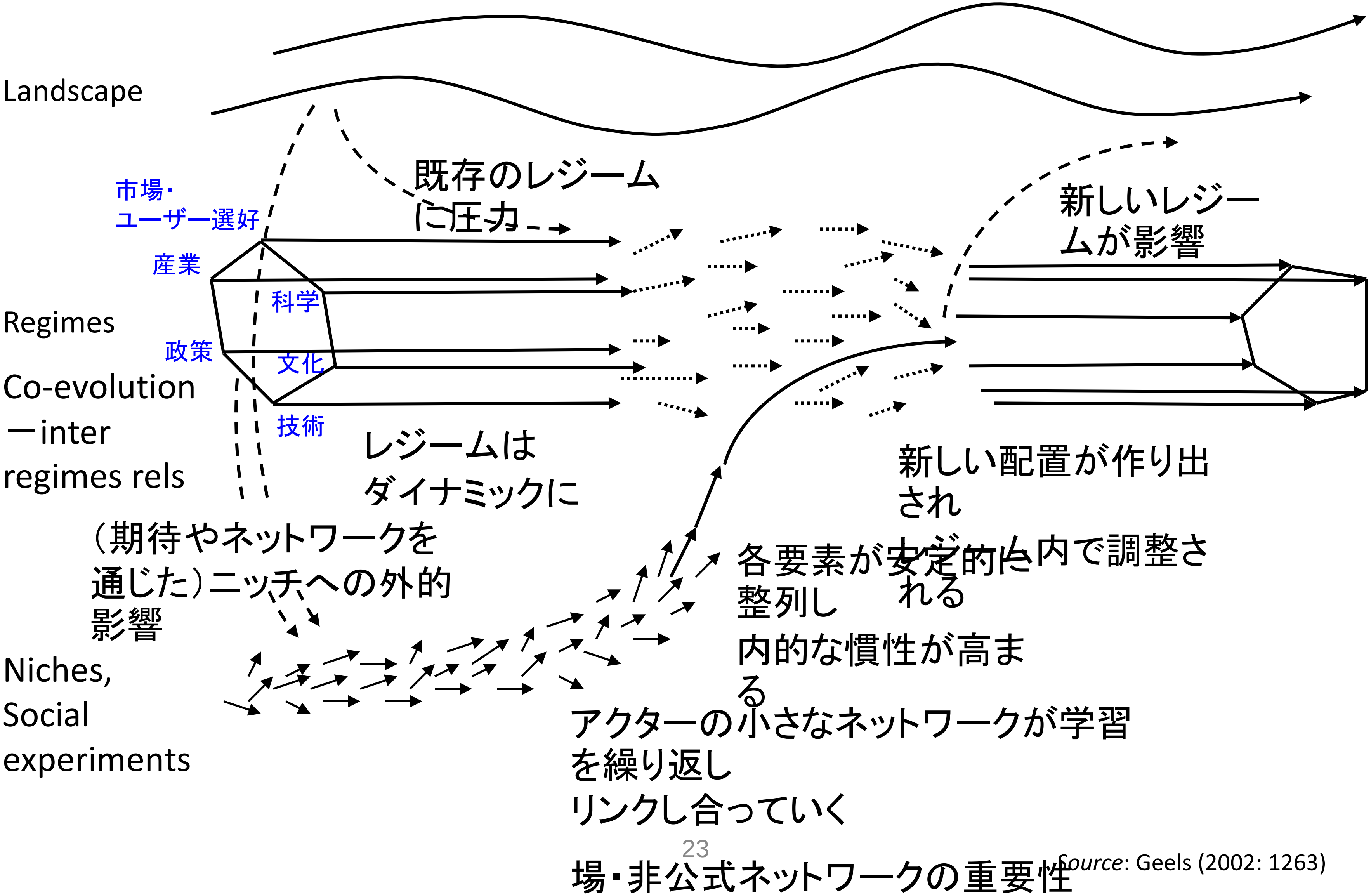


In 2035, emission per capita in China is similar to emission per capita in average OECD countries

6. Need for Transition Governance

- ST needs to be connected to concrete use communities (sectoral policy network of energy) - institutions
- The transition management tries to utilize innovative bottom-up developments by coordinating different levels (niches, regimes, landscape) of governance and fostering self-organization, generating cycles of learning, giving special attention to co-evolution, where different subsystems are shaping but not determining each other
- Concrete methods and strategies for TM can be different depending on institutional and cultural contexts

Structure of Transition Management



Source: Geels (2002: 1263)

Issues of Transition Management

- Technology push and demand – communication issues
- Grand design or incremental
- Inter system (regimes) relations cf. Co-evolution

  Ex: Energy, Agriculture, Health cf. Historical role of refrigerators

  Ex: Future city projects（環境未来都市）– environment and health

  Ex: Housing as a platform – environmental, energy supply security and health
- Technology introduction and institutions
- Importance of outsiders（外部者）、informal arena（非公式な場）
- ”Tipping point”　in the transition process

  cf. Inter-regional grid connection issues for renewable in Japan – grid between Northern part of Japan and Tokyo areas for nuclear can be used for renewable?
- Importance of uncertainty