APEC Energy Demand and Supply Outlook

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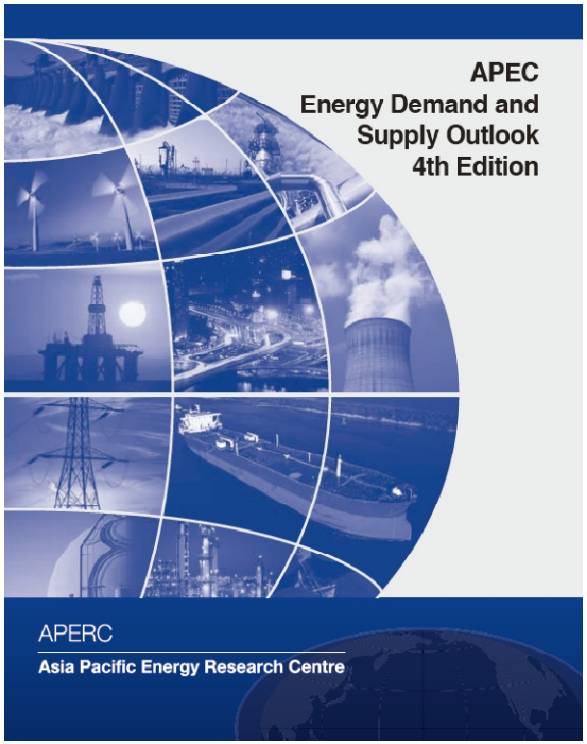
Economic Cooperation

Background on the Outlook

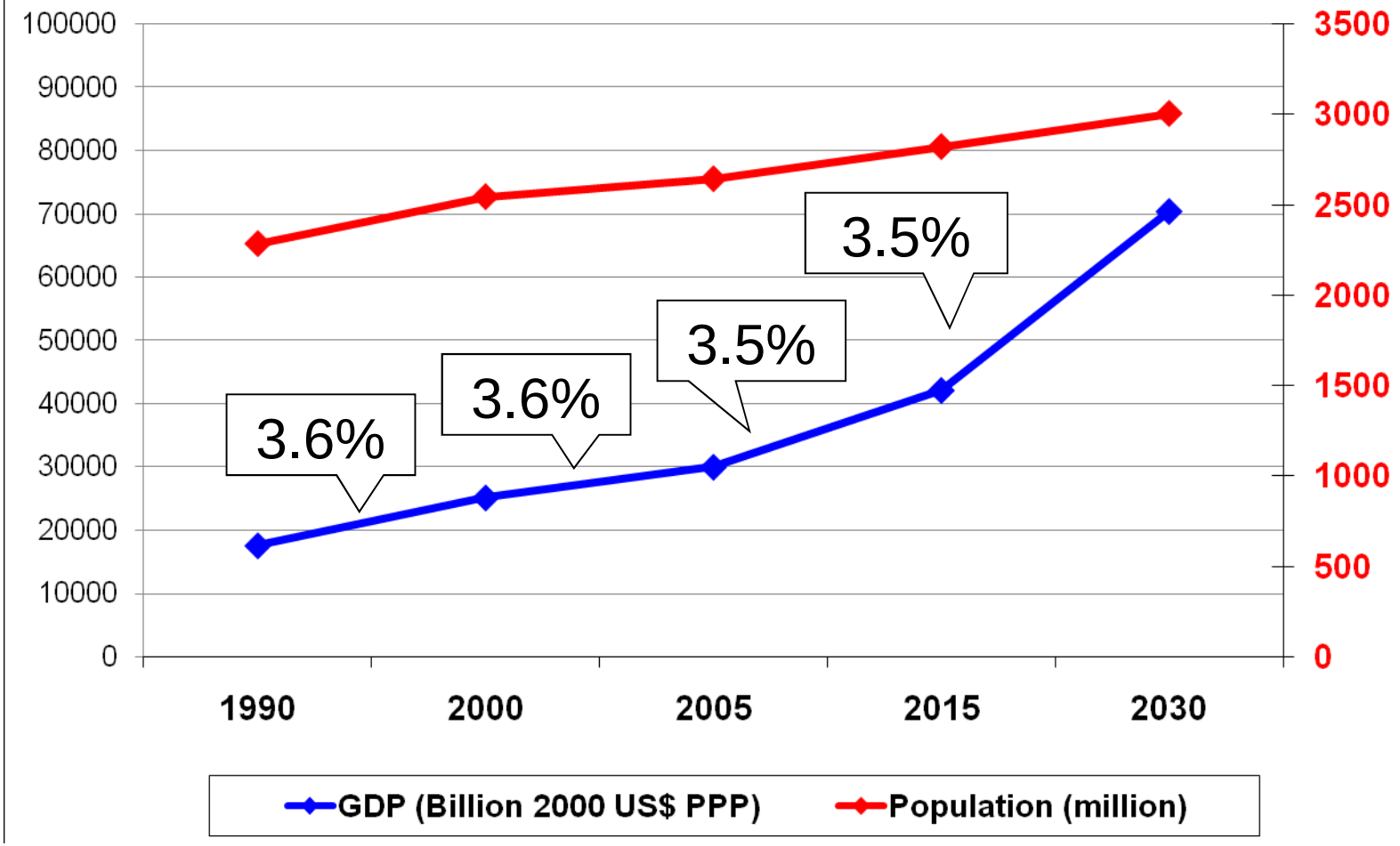


- Long-term (to 2030) perspective on APEC Energy Demand and Supply
- Summarizes wide range of energy issues in all APEC economies
- Relies heavily on advice and feedback from APEC government experts
- Three previous editions, last one in 2006

Assumed Key Driving Trends

- Despite recent economic crisis, continued economic growth and progress over the long-term, especially in developing economies
  - Shift to commercial fuels and electrification
  - Motorization
  - This is a good thing, especially for millions of people who will be lifted out of poverty
  - But it does pose some significant energy challenges
- Oil prices remain moderate, at least on average ($120/barrel by 2030)

Assumed GDP and Population

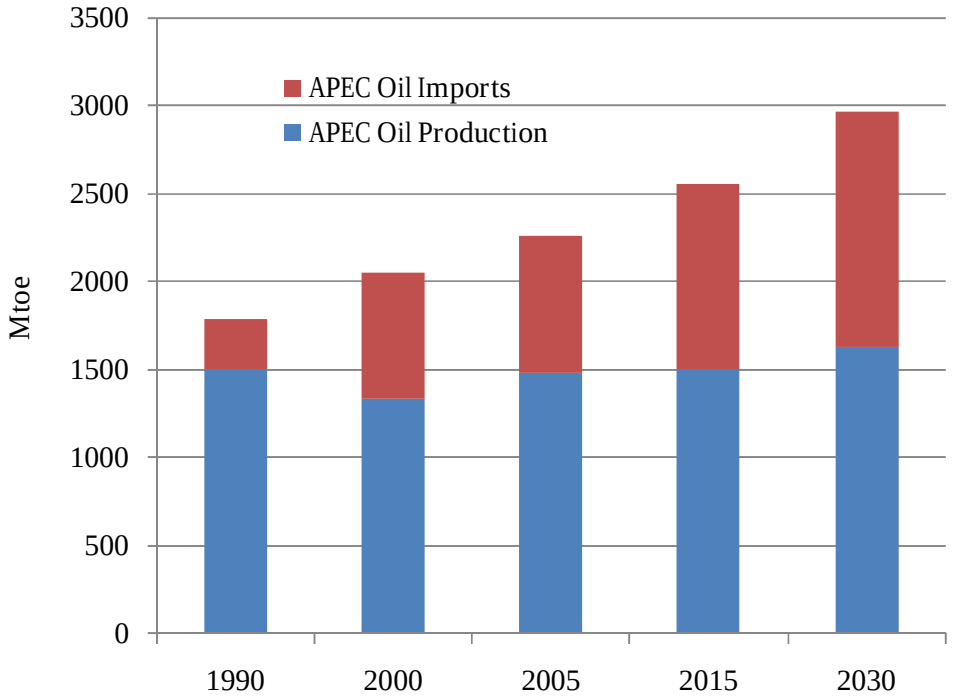


Business-As-Usual Assumption

- Energy policies of APEC governments changing rapidly
  - Economic crisis response
  - Oil security response
  - Climate change response
- *Clearly, the future will not be business-as-usual*
- Yet, business-as-usual can still provide a key benchmark for analyzing any future changes
  - Avoids risk of ‘counting chickens before they are hatched’
  - Building in predictions of policy response is confusing
- Definition of Business-As-Usual (BAU):
  - Includes policies already being implemented
  - Does *not* include ‘targets’, ‘goals’, or policies governments may have announced unless their implementation is certain and well defined

Conclusion #1: Oil Security

Oil Security Remains a Major Threat to the Economy of the APEC Region



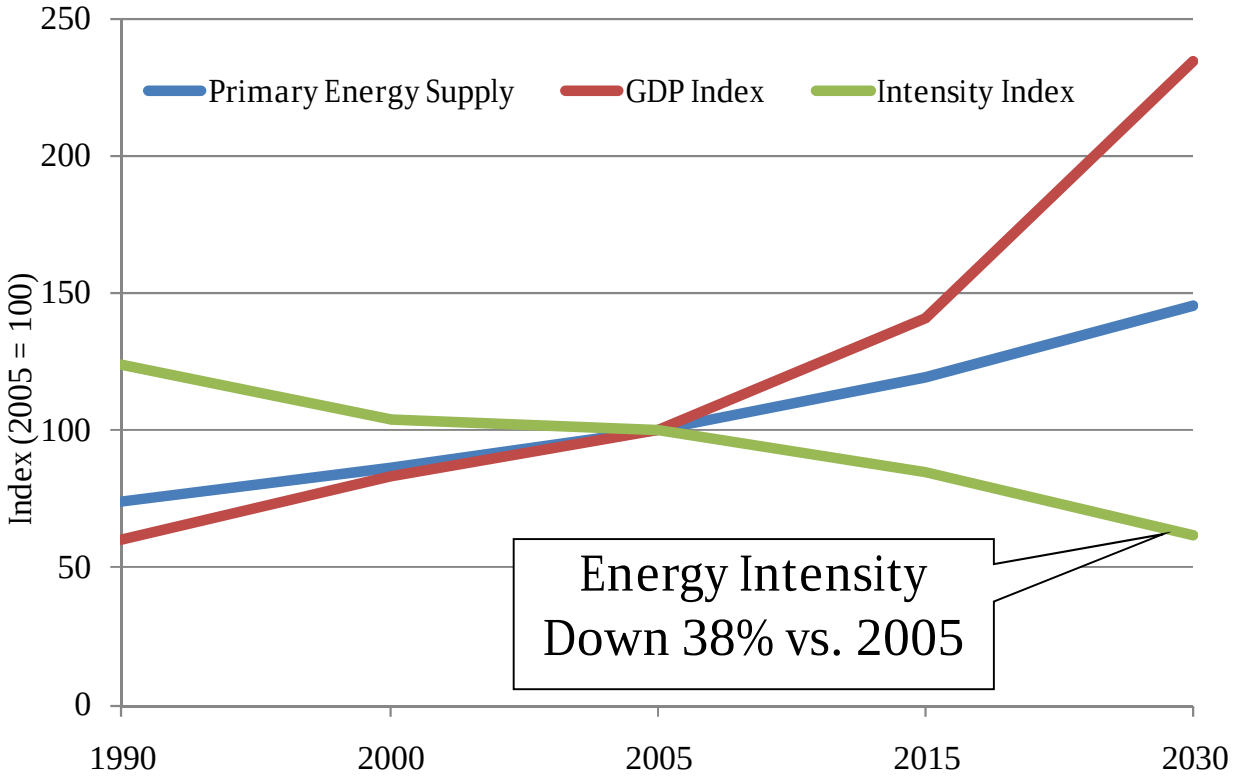
Implications of Import Dependency

- Oil import dependency implies:
  - Dependence upon political events in other regions, such as the Middle East and Africa
  - Dependence upon national oil companies and multi-national oil companies to make adequate investments
  - Oil prices increasingly influenced by market power of producing countries
  - Dependence upon secure transport from the Middle East and Africa
- Likely Outcomes:
  - Continued oil price volatility a near certainty
  - Significant risks of supply disruptions
  - Both of the above threaten the economic stability of the APEC economies and the world

Conclusion #2: Economic Crisis Impacts

- Governments are working together to unlock financial markets
- Yet current economic crisis increases risk of inadequate investment in energy infrastructure
  - Could threaten security of supply and price stability as the economy recovers
- A positive side-effect of government intervention may be to direct energy investment in more secure and environmentally-friendly sources

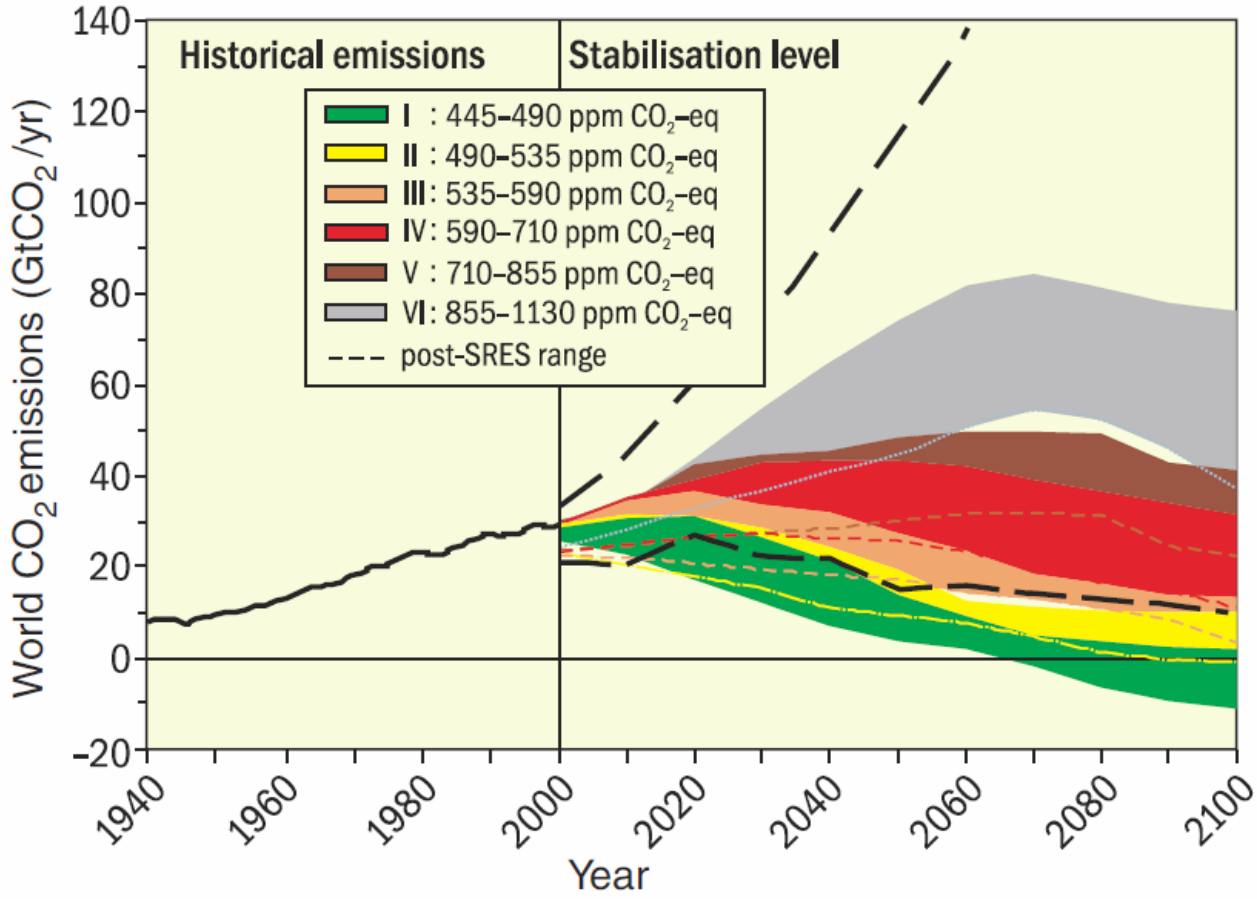
Conclusion #3: Minimum APEC Intensity Goals Will Be Met Under BAU



Conclusion #4: BAU is Still Environmentally Unsustainable

- The best science says that the path we are on has a great probability of disastrous climate change consequences
- Graph on the following slide illustrates the dilemma (Taken from the IPCC *Fourth Assessment Report; Synthesis Report, 2007,* p.66)

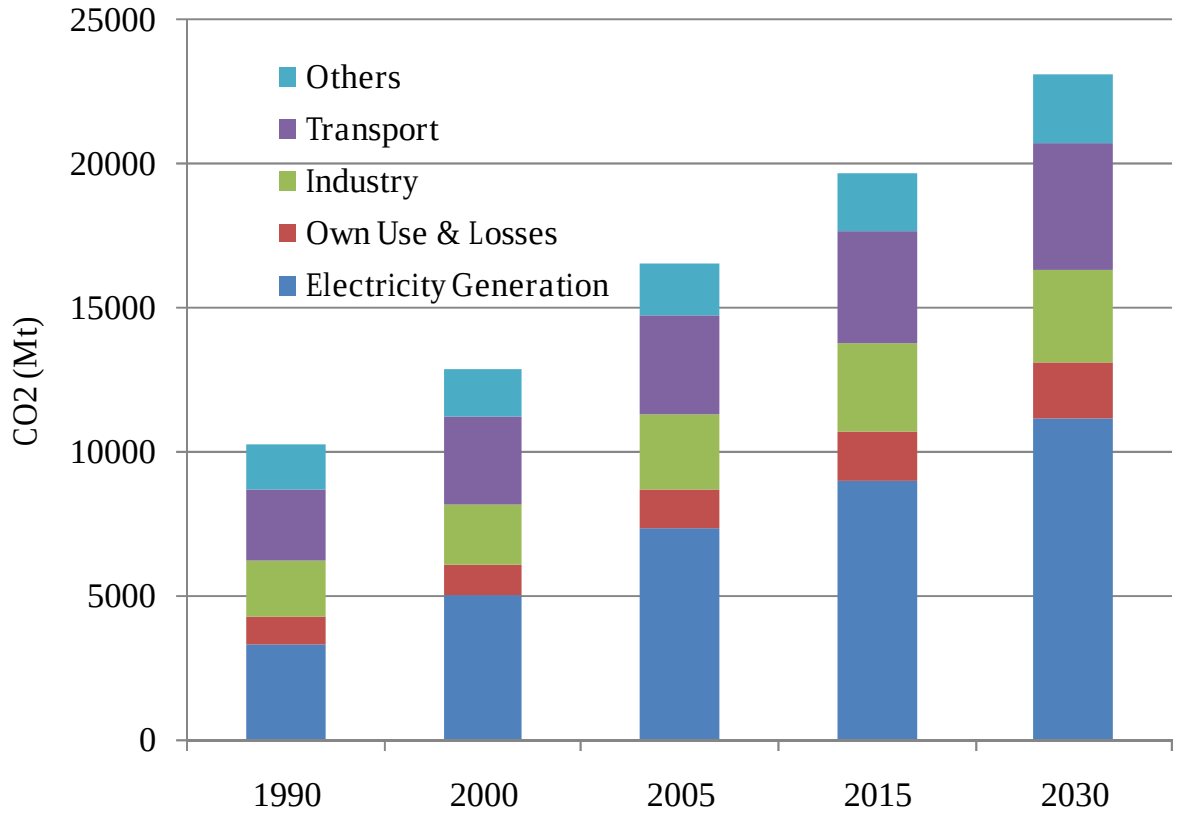
Emissions vs. CO_2 Concentrations



What Happens If CO2e>445-490 ppm?

- Rising in sea level
- Declines in global food production potential
- Future tropical cyclones (hurricanes and typhoons) become more intense
- Melting glaciers and loss of snow cover
- Adverse health impacts
- Droughts and heat
- Damage to coral reefs and dependent species
- Greater frequency of extreme weather events
- Widespread extinctions of wildlife

APEC CO_2 Emissions from Fuel Combustion



Conclusion #5: Push for Sustainability

- Many APEC governments are greatly expanding efforts to promote energy efficiency and low-carbon energy supply
- Examples:
  - China: 11th Plan for Economic and Social Development
  - Japan: “Cool Earth 50”
  - USA: “American Recovery and Reinvestment Act of 2009”
- But more effort will still be needed for a more secure and sustainable future
- APEC/APERC Peer Reviews of Energy Efficiency (PREE) expected to help make these efforts more effective

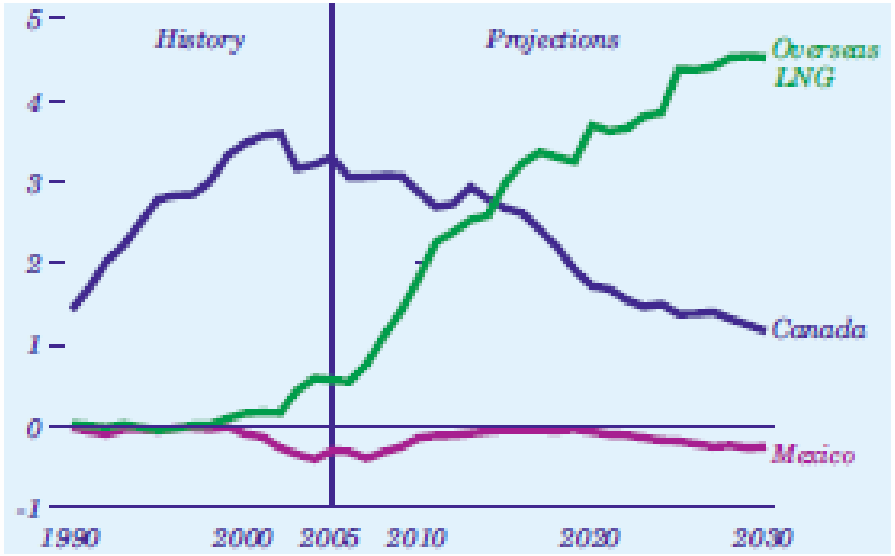
Conclusion #6: 'Game Changing' Role of New Technologies

- New technologies rapidly changing the APEC energy picture
- Potential of new technologies often underestimated , especially the ones on the cutting edge of science
- Today these would include
  - Solid state devices (batteries, fuel cells, LED lamps, solar PV)
  - Bio-engineering (algae for biofuel)
  - Particle physics (fusion, advanced nuclear)

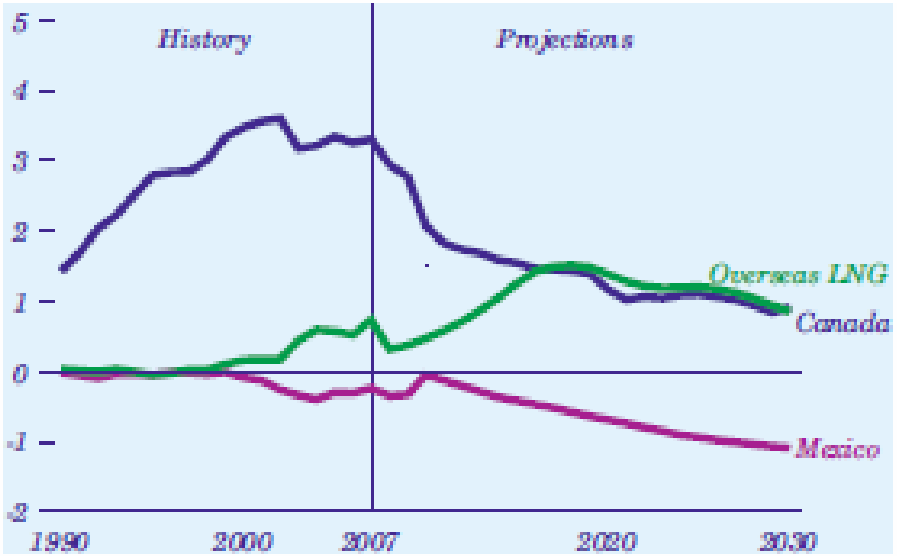
New Technologies Example #1: Unconventional Gas

- Until recently, United States gas production seen as not keeping pace with demand
  - Result was expected to be need for United States to import large volumes of LNG
- Improved unconventional gas technology has completely changed this outlook
- Effects are significant
  - Reduces need for gas imports from outside APEC
  - Gas can be used to displace coal
  - Same technology can potentially be applied in other economies

EIA *Annual Energy Outlook* Gas Import Projections for USA



2007

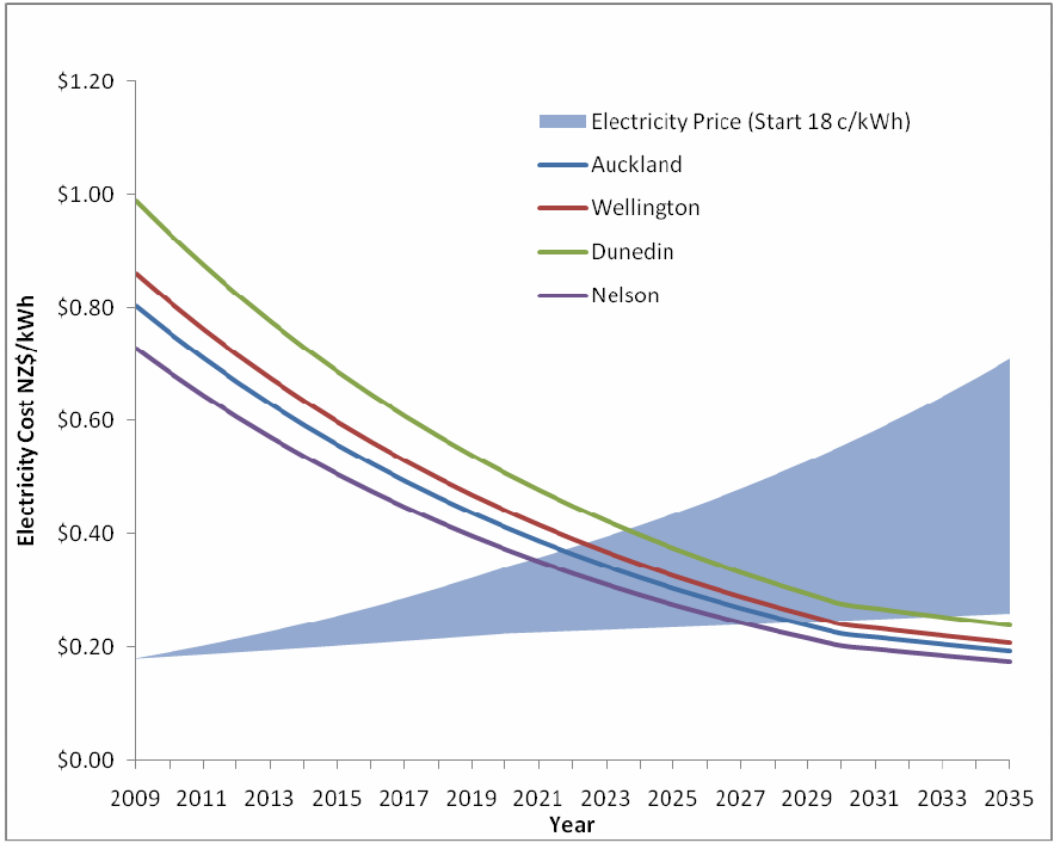


2009

New Technologies Example #2: Solar Photovoltaics (PV)

- Historically, solar PV has been uncompetitive
- Yet solar is a solid state technology very amenable to the application of advanced science
  - Solar PV costs declining rapidly—by a factor or 100 since the 1950's
- Unsubsidized cost only needs to be competitive with the retail price of electricity
  - Could happen in high cost electricity locations, such as California or Tokyo, in three to seven years

Projected Cost of Solar PV in New Zealand



Source: IT Power Australia Ltd. and Southern Perspectives Pty Ltd., *Assessment of the Future Costs and Performance of Solar Photovoltaic Technologies in New Zealand,* April 2009.

Thoughts on Technology

- Impacts of competitively-priced solar PV could be huge
  - Especially when combined with other innovative technologies, such as better batteries and LED lamps
  - Renewable electricity available anywhere in almost unlimited quantities
- Illustrates need for government policies that are supportive of new technology and entrepreneurship

Discussion

- Questions and Comments?