Building on Kyoto: Towards a Realistic Global Climate Change Agreement and What Australia Should Do

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&

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Overview

- Climate Science
- Lessons from Kyoto
- Why uncertainty matters
- An approach that focuses on uncertainty
- Some illustrations
- Accelerated deployment of advanced technology
- Conclusion for the Australian policy debate

Climate Science

- **Significant body of opinion by scientists that we need to reduce greenhouse concentrations in the atmosphere to reduce the risk of dangerous climate change.**

Climate Science

- **Science does not tell us what the global concentration target should be - but it guides us**
- **Science does not tell us which of the many global paths of emissions should be followed for a given concentration target**
- **Science has nothing to say about what target an individual country should follow**

Climate Change Policy

- **Should be about enabling the whole society to manage the risks associated with climate change**

- **Should be about creating long term institutions and clear policy frameworks that can steer the global economy towards a less carbon intensive future**

- **Should be about creating a system that all countries find in their own self interest to be involved**

Lessons from Kyoto Experience

- **A system of rigid targets and timetables is difficult to negotiate because it is a zero sum game**

- **It is problematic for countries to commit to a rigid target for emissions under uncertainty about costs**

- **Even the most dedicated countries may be unable to meet their targets due to unforeseen events out of their control**

Key Point

- **Different global climate policy regimes handle uncertainty very differently**

- **National climate policy needs to deal with uncertainty as well**

Some Examples

- **Use a global economic model to show some key uncertainties and how to deal with these issues in the global framework**

- **Policy design should not rely on even the best economic models to be correct**

The G-Cubed Model

⇨ Countries (10)

United States
Japan
Australia
Europe
Rest of OECD
China
India
Eastern Europe and Former Soviet Union
Oil Exporting Developing Countries
Other non Oil Exporting Developing Countries

Solved annually

The G-Cubed Model

⇨ Sectors (12)

Electric Utilities
Gas Utilities
Petroleum Refining
Coal Mining
Crude Oil and Gas Extraction
Other Mining
Agriculture, Fishing and Hunting
Forestry and Wood Products
Durable Manufacturing
Non Durable Manufacturing
Transportation
Services

Capital Producing sector

An illustrative example

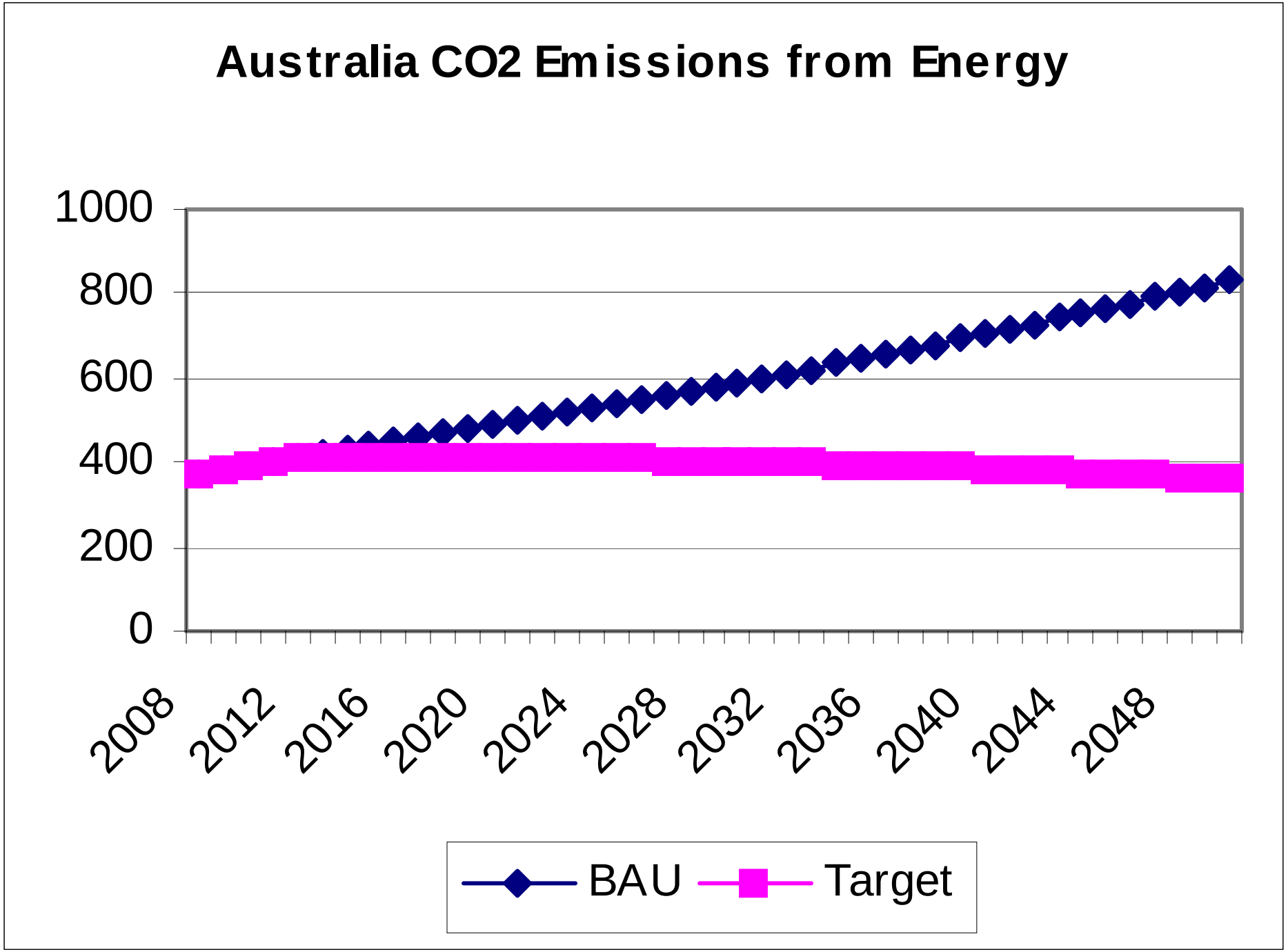
- **Generate a baseline of the model from 2002 to 2150**
- **Create a target path for emissions reduction to reach a global target of peaking emissions by 2028 and to be 60% below 2002 emissions by 2100.**
- **Impose an arbitrary but approximately equal burden across countries**

An illustrative example

- **Implement the policy by**

  ⇨ Country specific target

  ⇨ Permit trading globally


Australia CO2 Emissions from Energy
1000
800
600
400
200
0
2008
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
BAU
Target

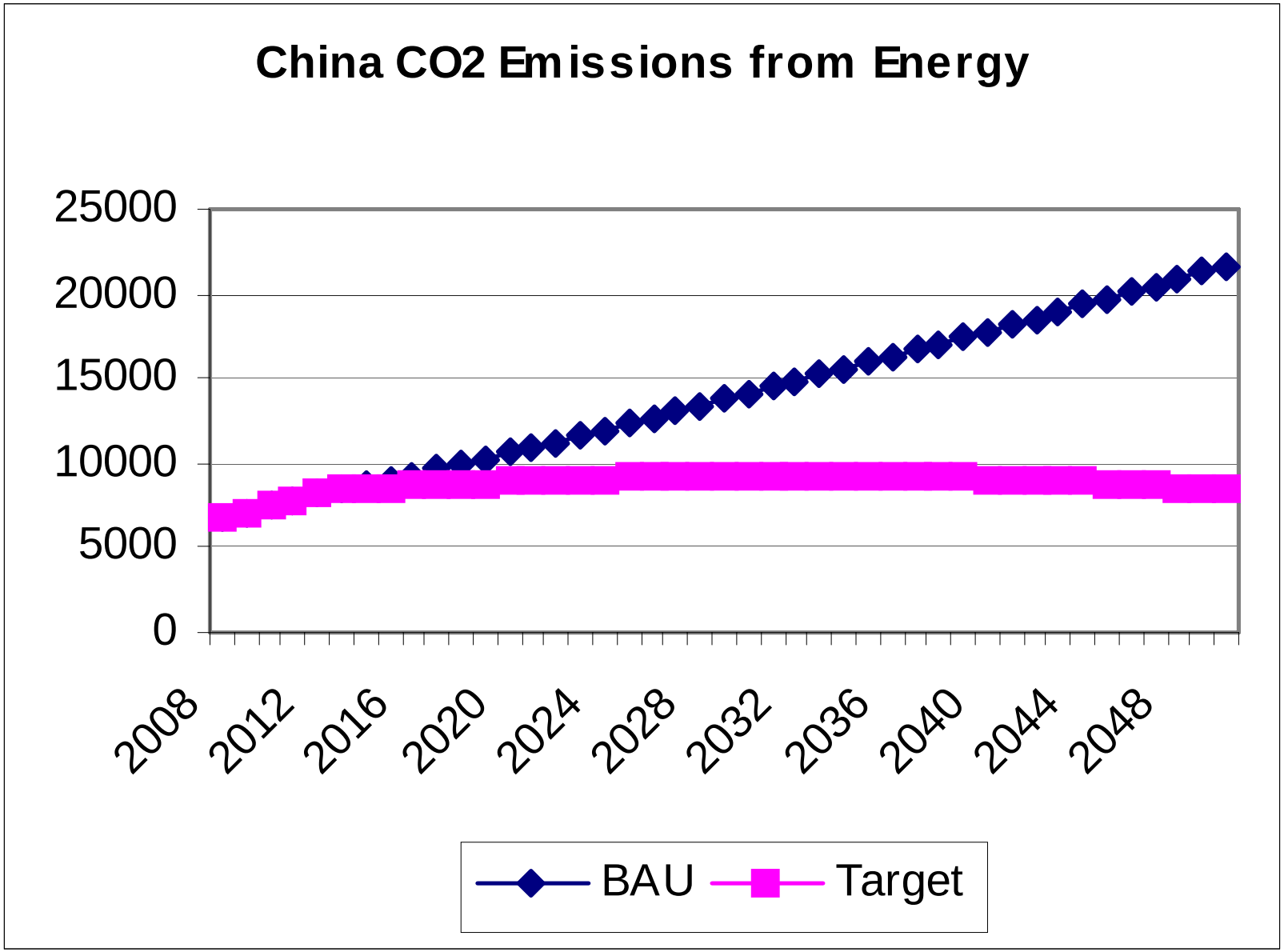
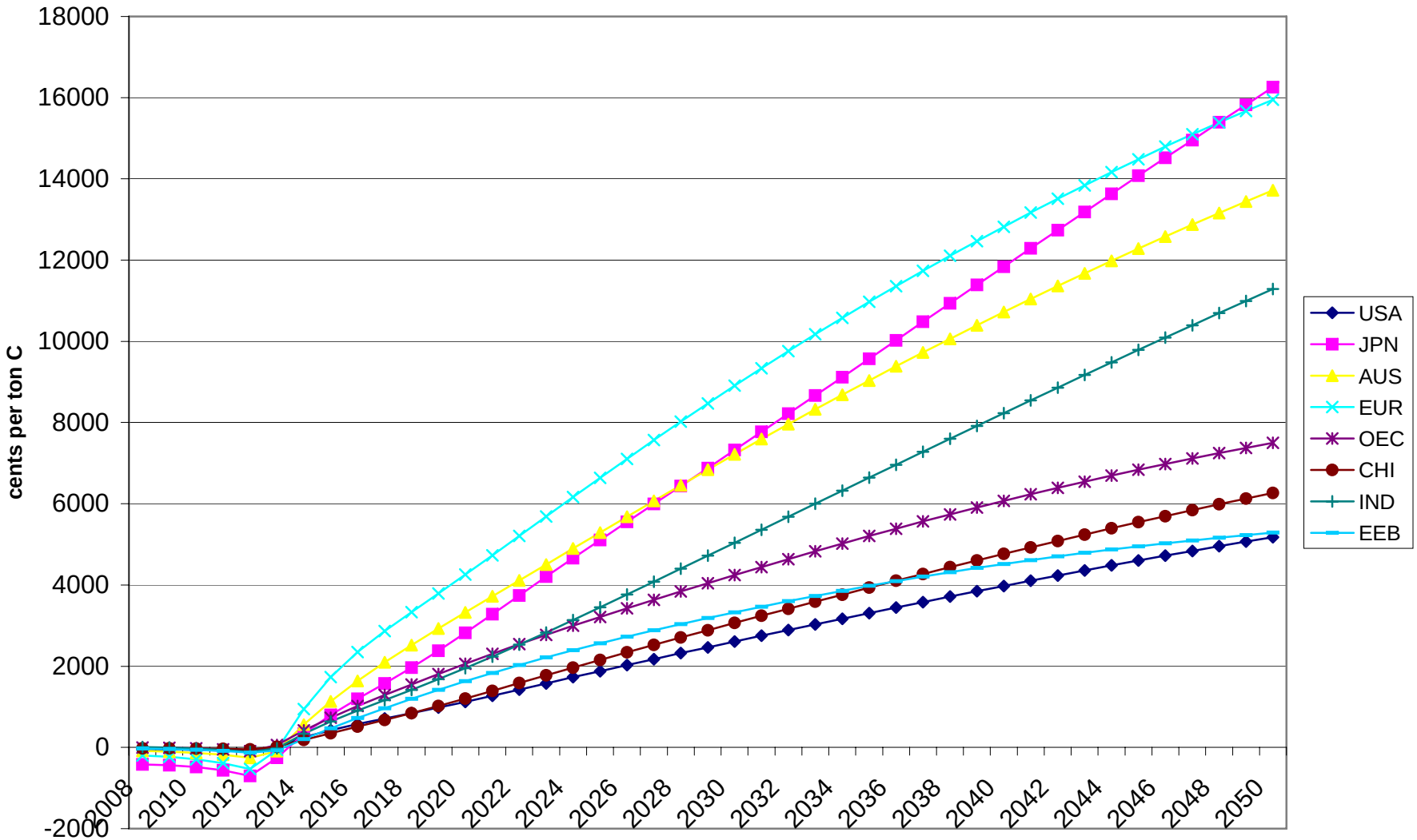

China CO2 Emissions from Energy
25000
20000
15000
10000
5000
0
2008
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
BAU
Target

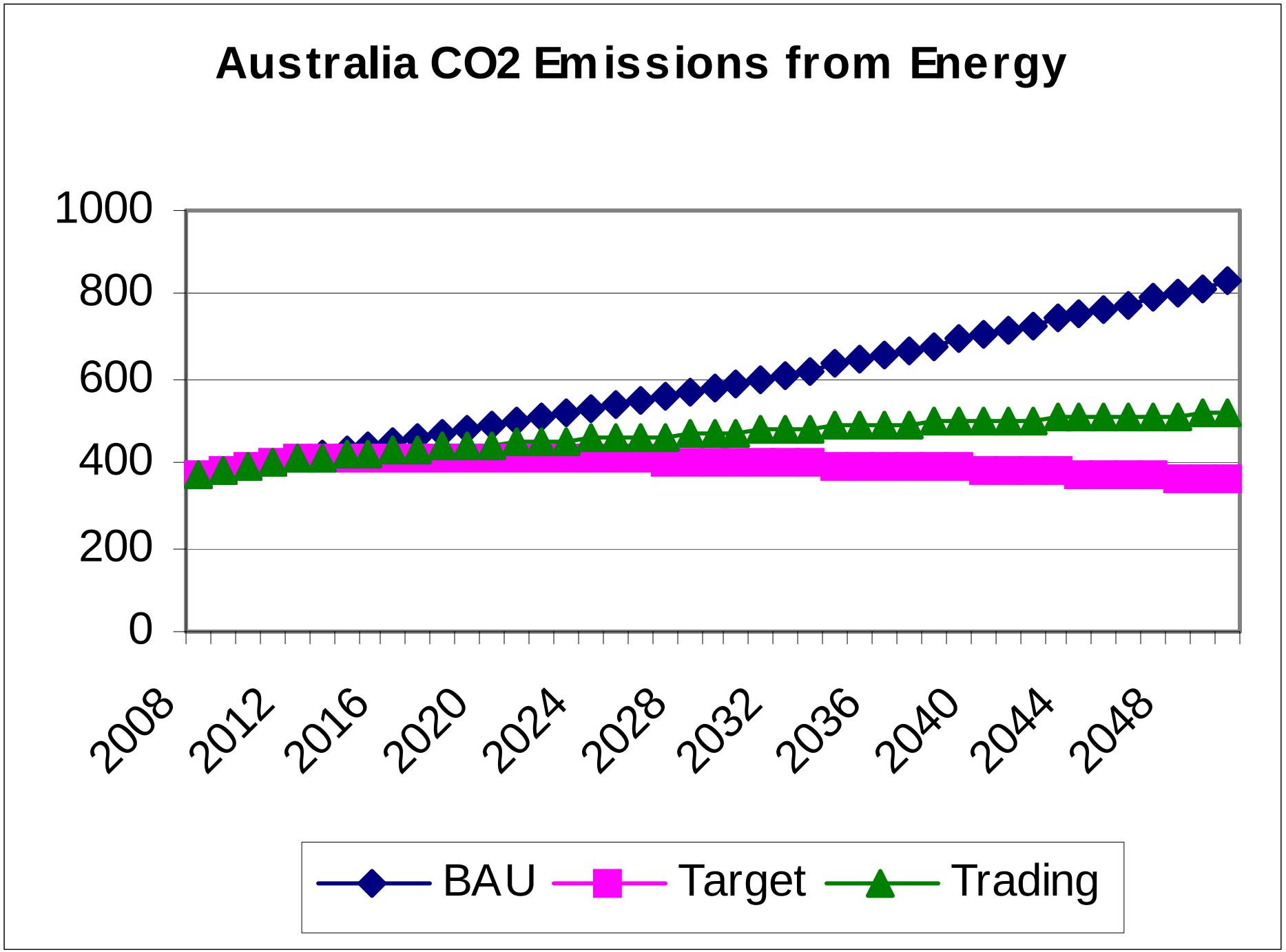
Figure 2: Carbon Prices by Country

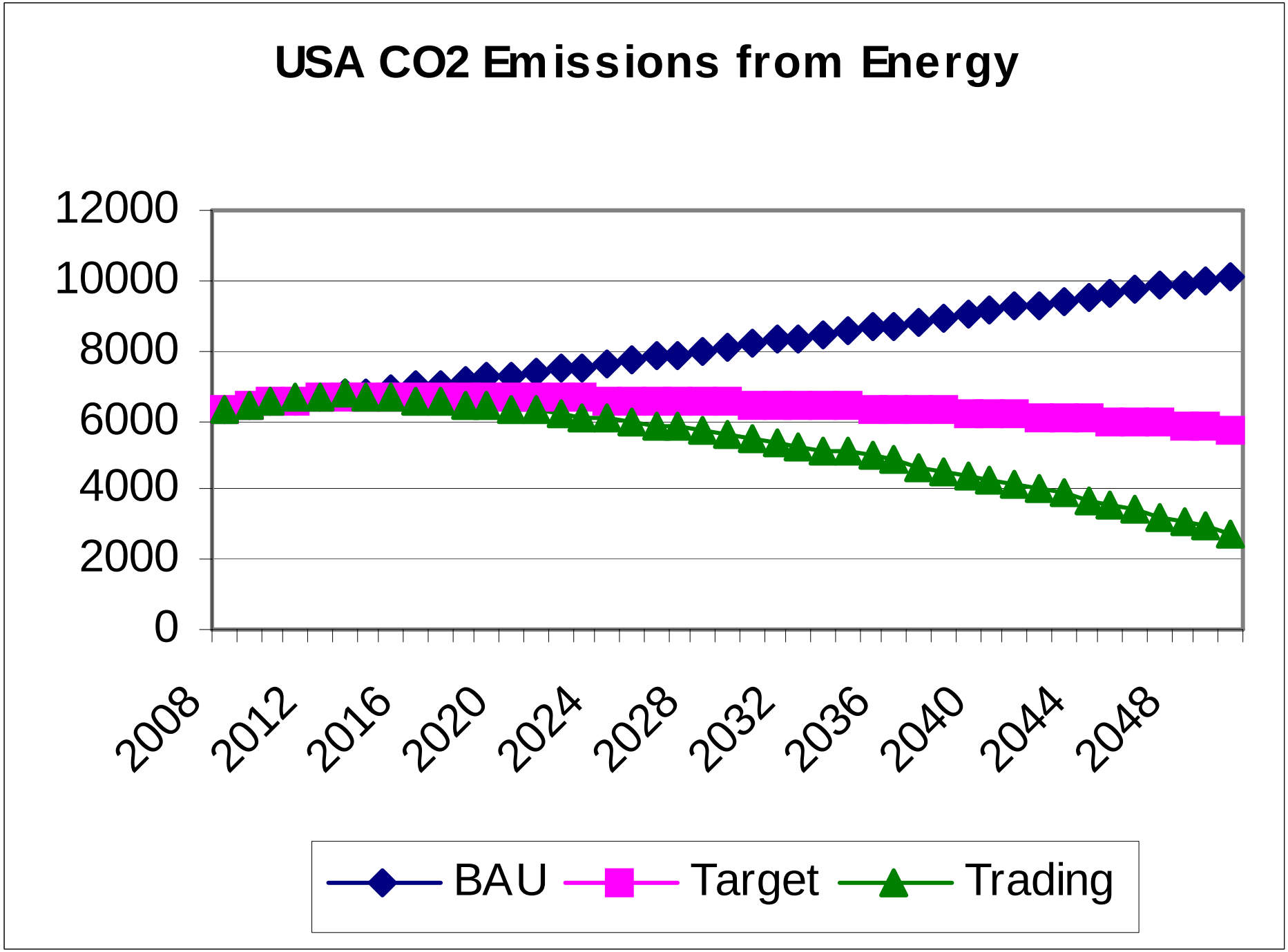


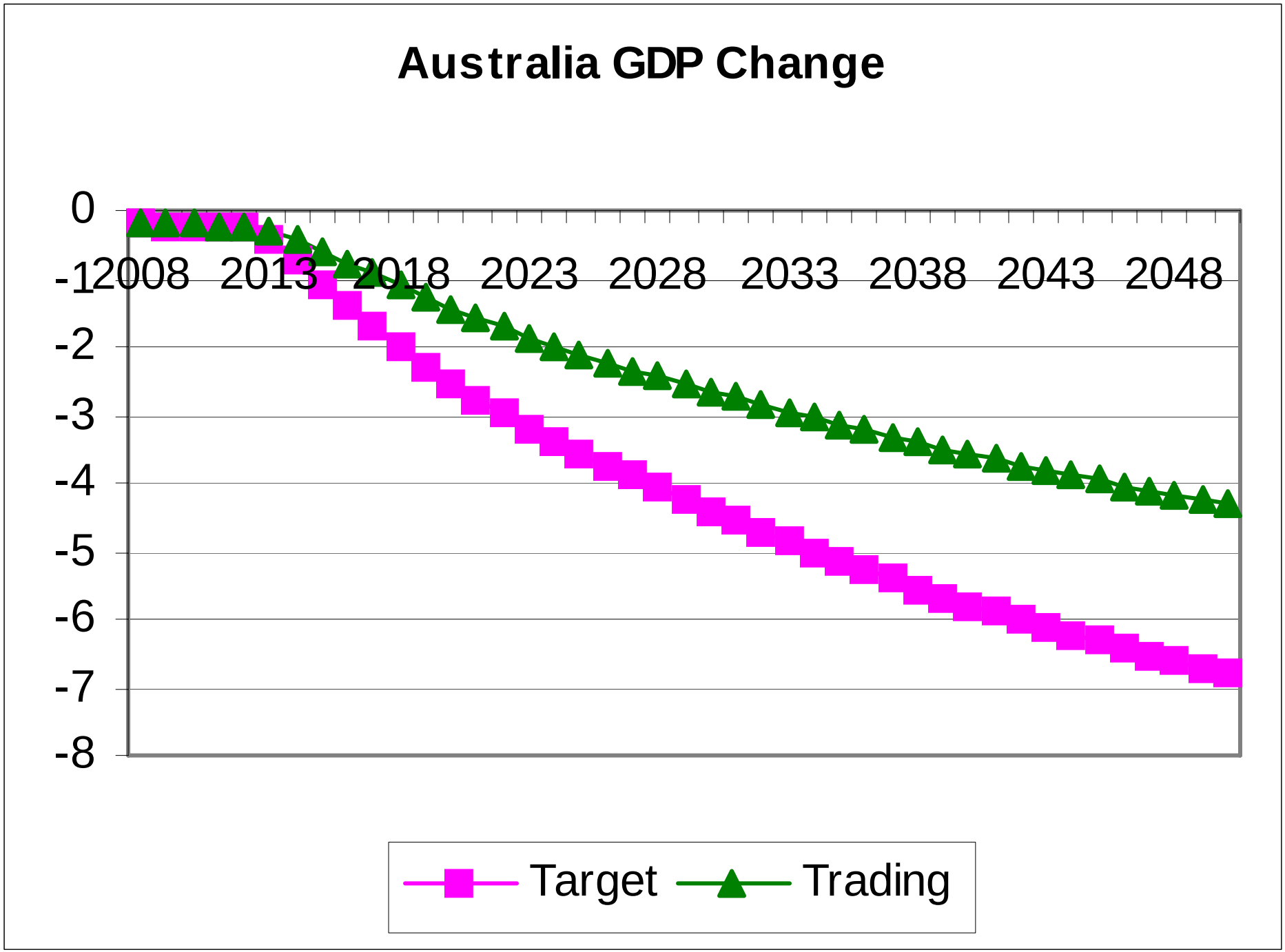
Now Allow Carbon Trading

- **Suppose initial allocation of permits is BAU emissions for illustrative purposes only**

- **Generates a common world price**
- **High cost abaters will buy permits**
- **Low cost abaters will sell permits**


Australia CO2 Emissions from Energy
1000
800
600
400
200
0
2008
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
BAU
Target
Trading


USA CO2 Emissions from Energy
12000
10000
8000
6000
4000
2000
0
2008
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
BAU
Target
Trading


Australia GDP Change
0
-1
-2
-3
-4
-5
-6
-7
-8
2008
2013
2018
2023
2028
2033
2038
2043
2048
Target
Trading

Trading is good in theory

- **Permit trading across countries reduces aggregate economic costs but does not solve the problem of uncertainty about the future costs of emissions control**

- **Political problem of transferring wealth offshore to pay for abatement**

- **Problem with short term price volatility and market manipulation**

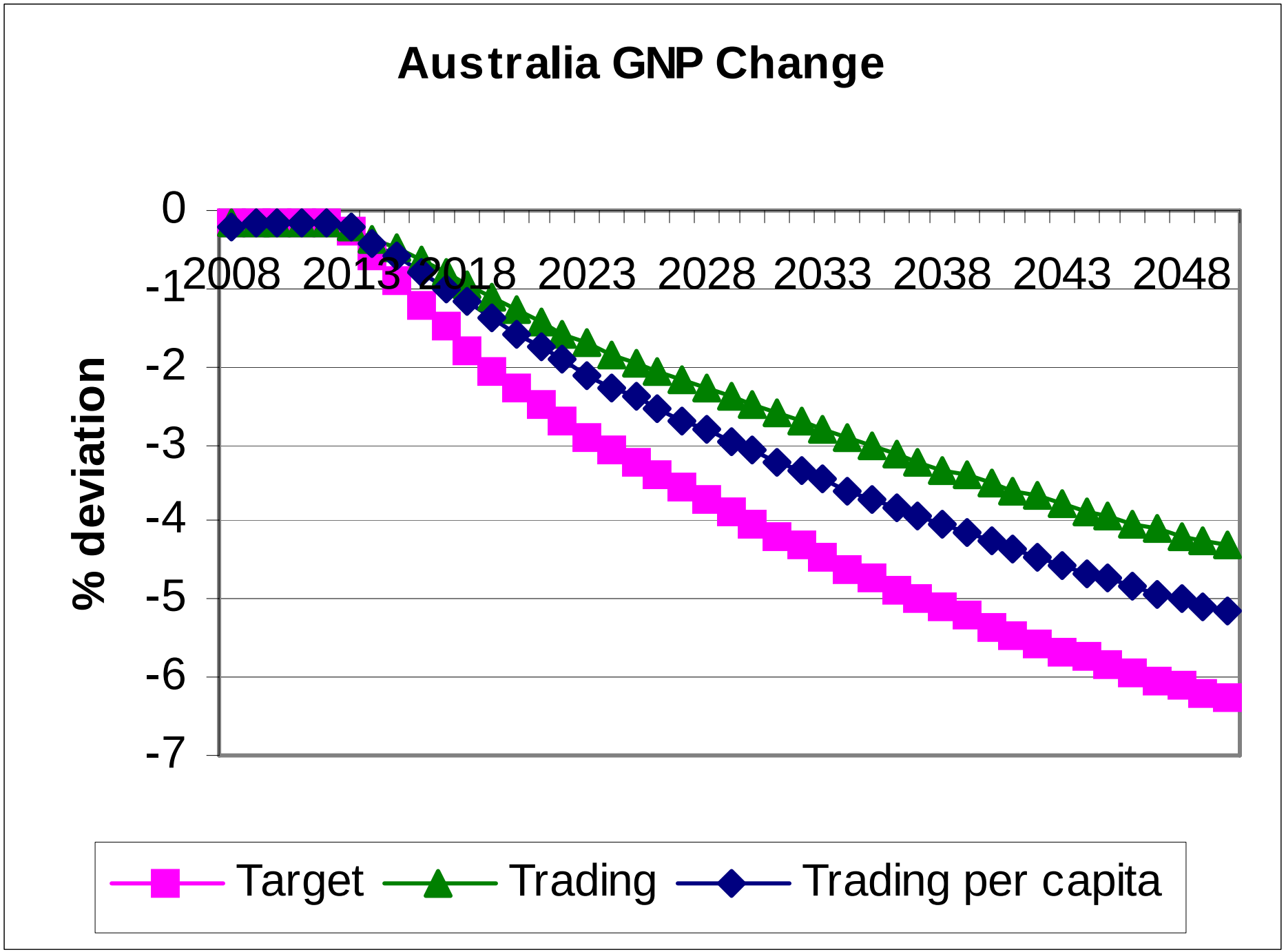
The Importance of permit allocation

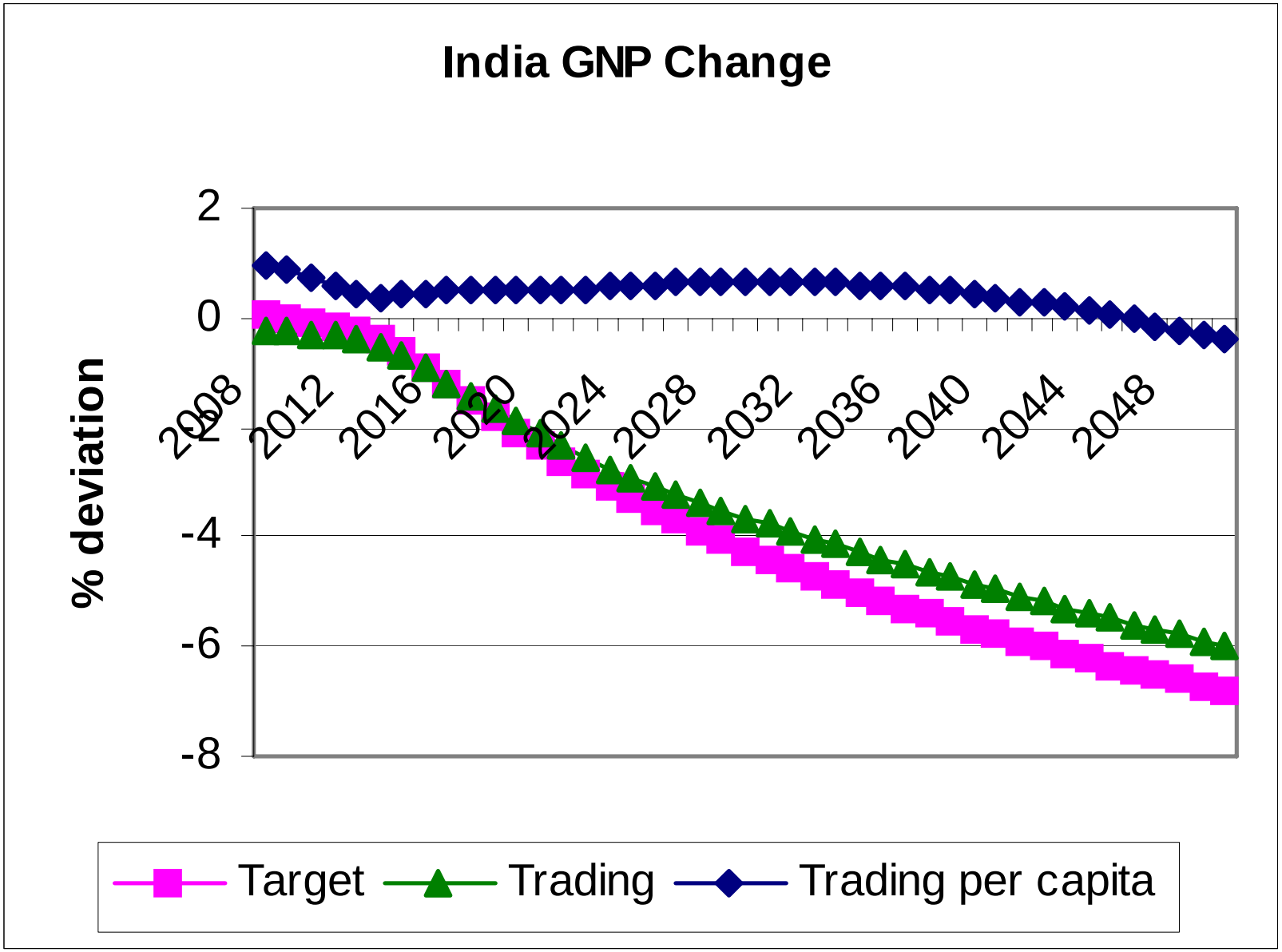
- **Now instead of BAU emissions suppose allocation is based on per capita emission rights**

Table 2: Allocation of CO2 Permits

	BAU 2013	Per Capita 2013	BAU 2040	Per Capita 2040
USA	6695	1502	6169	1484
Japan	1398	588	1286	414
Australia	415	103	385	104
Europe	4150	1713	3816	1429
Other OECD	666	296	618	278
China	8375	6321	9099	5197
India	1733	5852	1945	6045
non oil LDCS	5139	12875	5930	14792
EEFSU	2860	1075	2726	758
OPEC	1690	2797	1587	3061
Total	33121	33121	33562	33562

Source: Model simulations and UN Population Medium Term Projections


Australia GNP Change
% deviation
0
-1
-2
-3
-4
-5
-6
-7
2008
2013
2018
2023
2028
2033
2038
2043
2048
Target
Trading
Trading per capita


India GNP Change
% deviation
2
0
-2
-4
-6
-8
2008
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Target
Trading
Trading per capita

Uncertainty on the allocation

- **Creates large differences in cost across countries exacerbated by trading.**
- **Countries don’t know the costs of compliance before committing to the policy**
- **This is extremely difficult to negotiate without having a clear mechanism for non compliance**

What is needed

- **Need to negotiate a global target that can be adjusted over time as information on climate and costs of compliance change**

- **Need to negotiate an initial goal for each country but have a clear method for fairly dealing with non compliance due to unexpected excessive costs over time**

An alternative Hybrid approach: The McKibbin Wilcoxen Hybrid

- **Aim**
  - ⇨ Impose a long term carbon goal for the world and distribute across economies
  - ⇨ Generate a long term price for carbon in each country to guide energy related investment decisions
  - ⇨ Line up short term economic costs across countries with expected environmental benefits
  - ⇨ Provide a way for corporation and households to manage climate risk
  - ⇨ Each country adopts nationally and cooperate globally

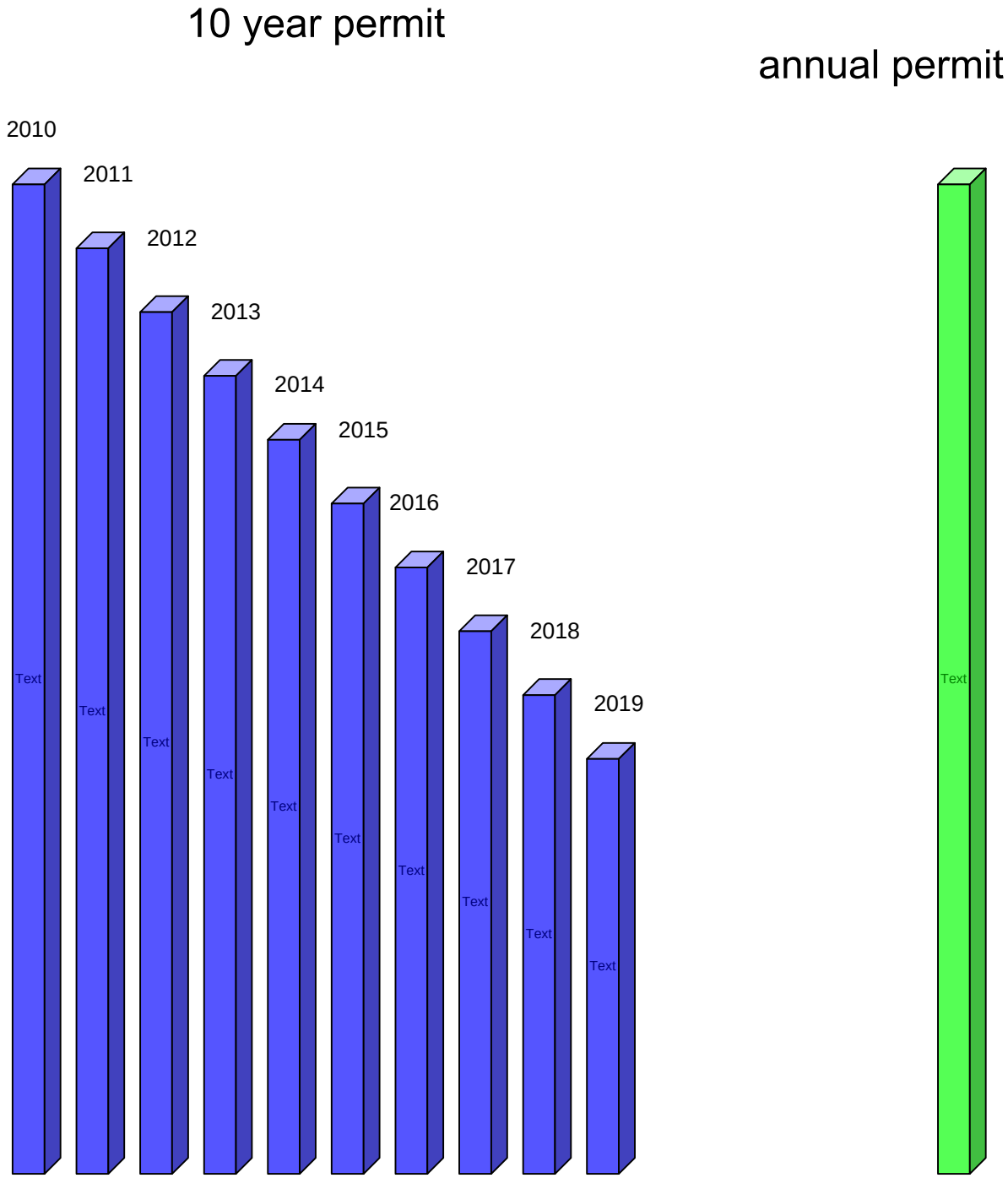
Components of the Policy

- **Long-term permits**
  - ⇨ A bundle of annual permits with different dates that the permits can be used
  - ⇨ Quantity of permits over time is the long run goal
  - ⇨ Supply is fixed (and diminishing) and allocated to households and industry
  - ⇨ Traded in a market with a flexible price

Components of the Policy

- **Annual permits**
  - ⇨ Must be acquitted against carbon emissions in the **year of issue**
  - ⇨ Expire in year of issue
  - ⇨ Elastic supply from national government
  - ⇨ Price fixed for five (or ten) years and then reset given information available
  - ⇨ Act as a “safety valve” to cap short term costs

- **Company must have a permit to emit carbon**


10 year permit
annual permit
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Text
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Text
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Text

National Permit Markets coordinated through International Cooperation

- **Independent but coordinated via P_T**

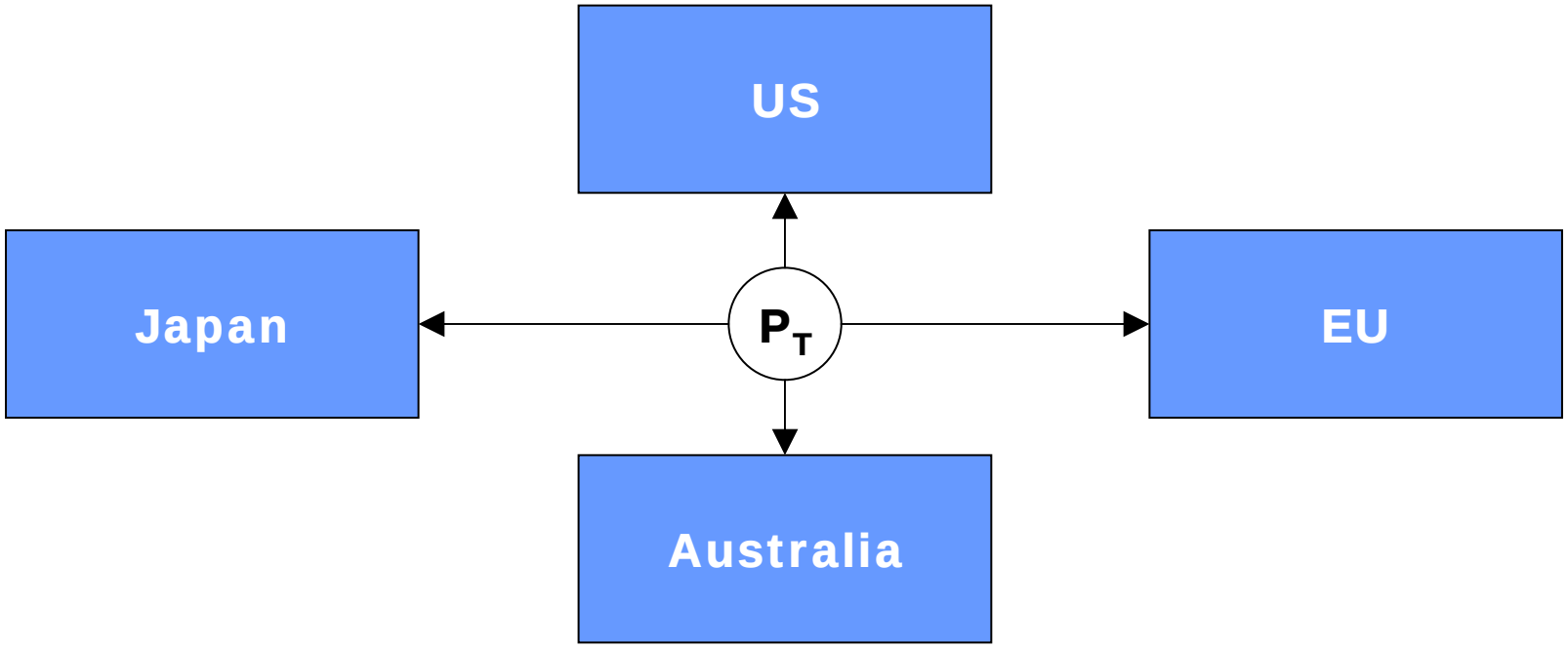


Fig 2: Emissions and Long Term Permits

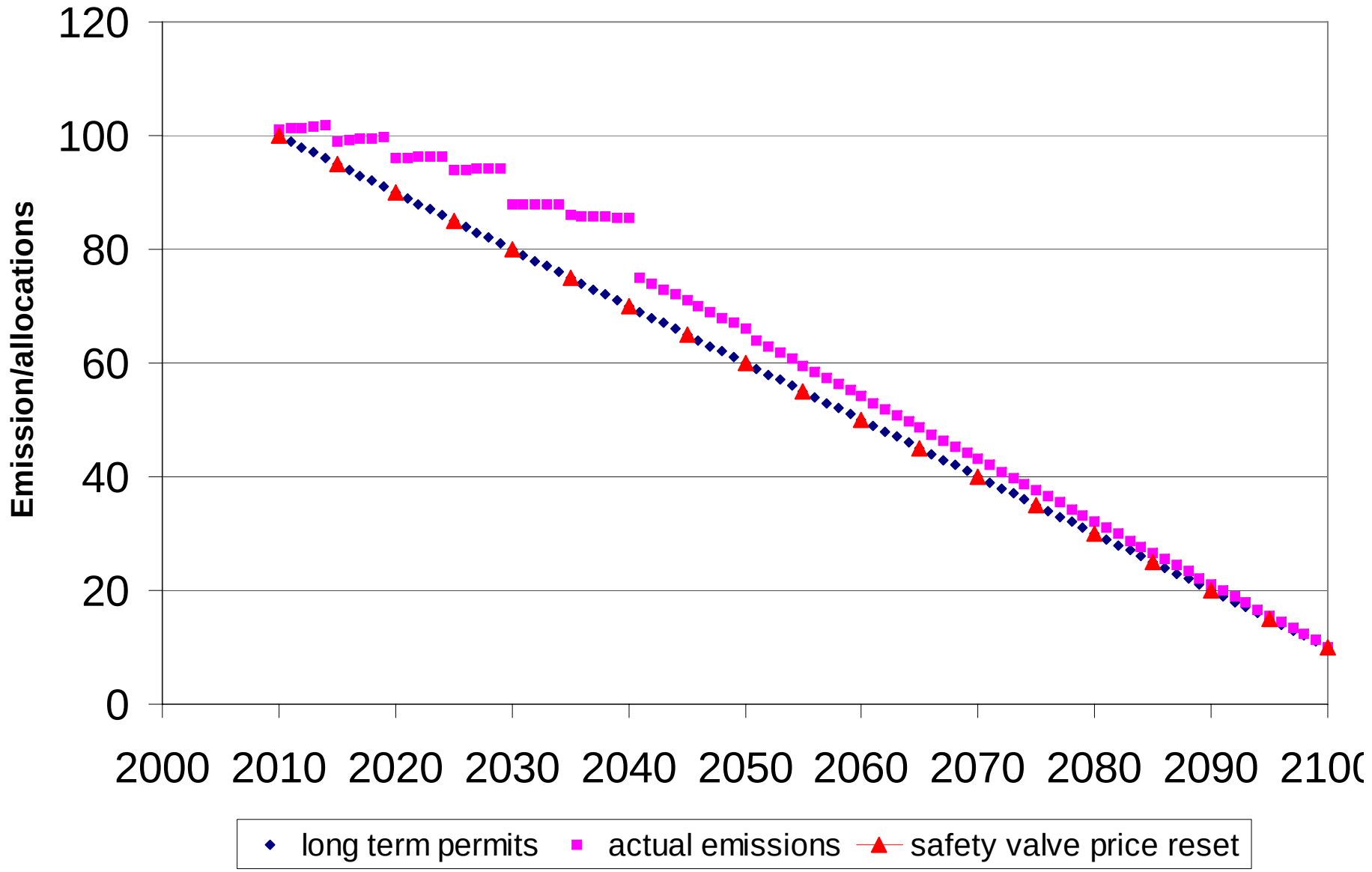


Figure 3 : Annual Permit Price

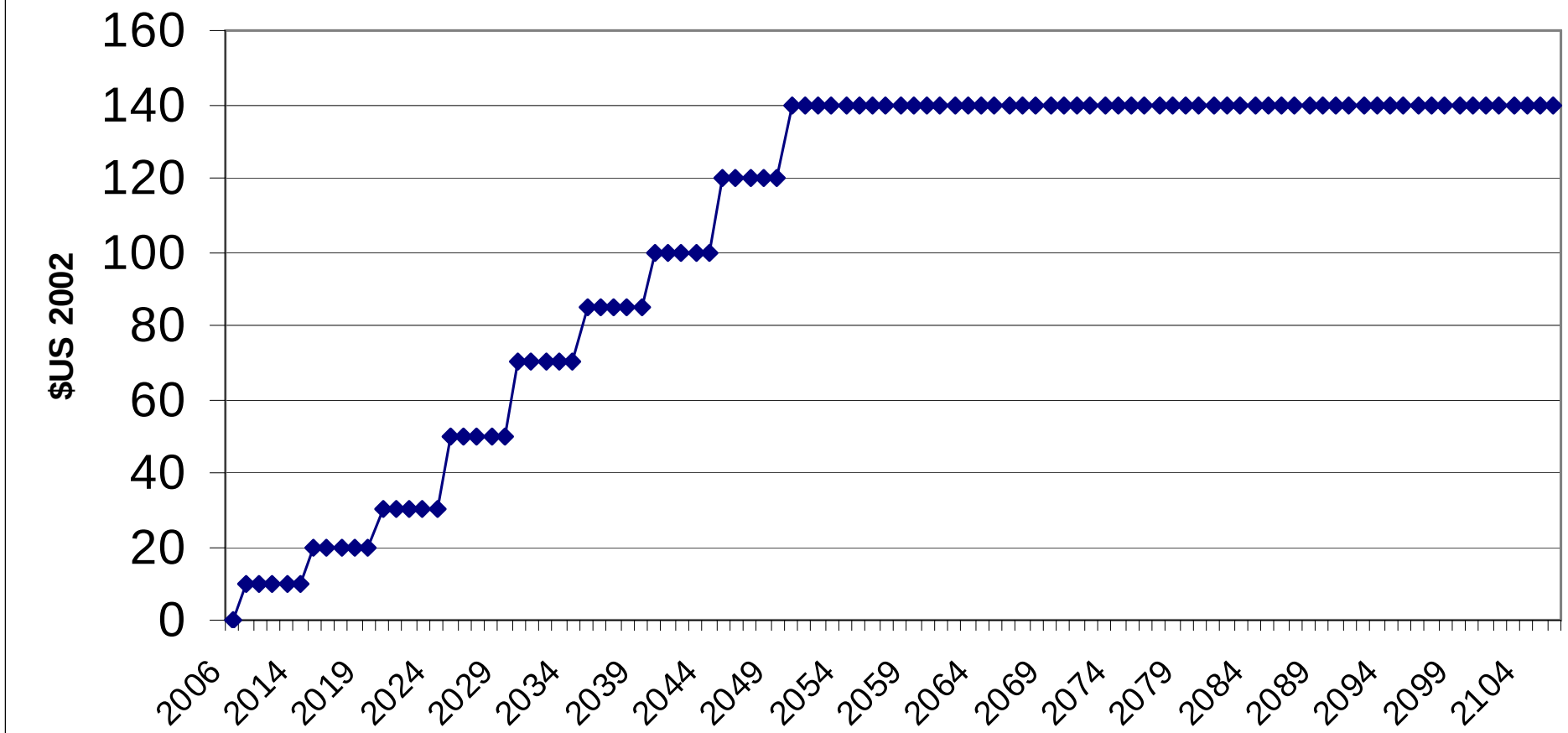
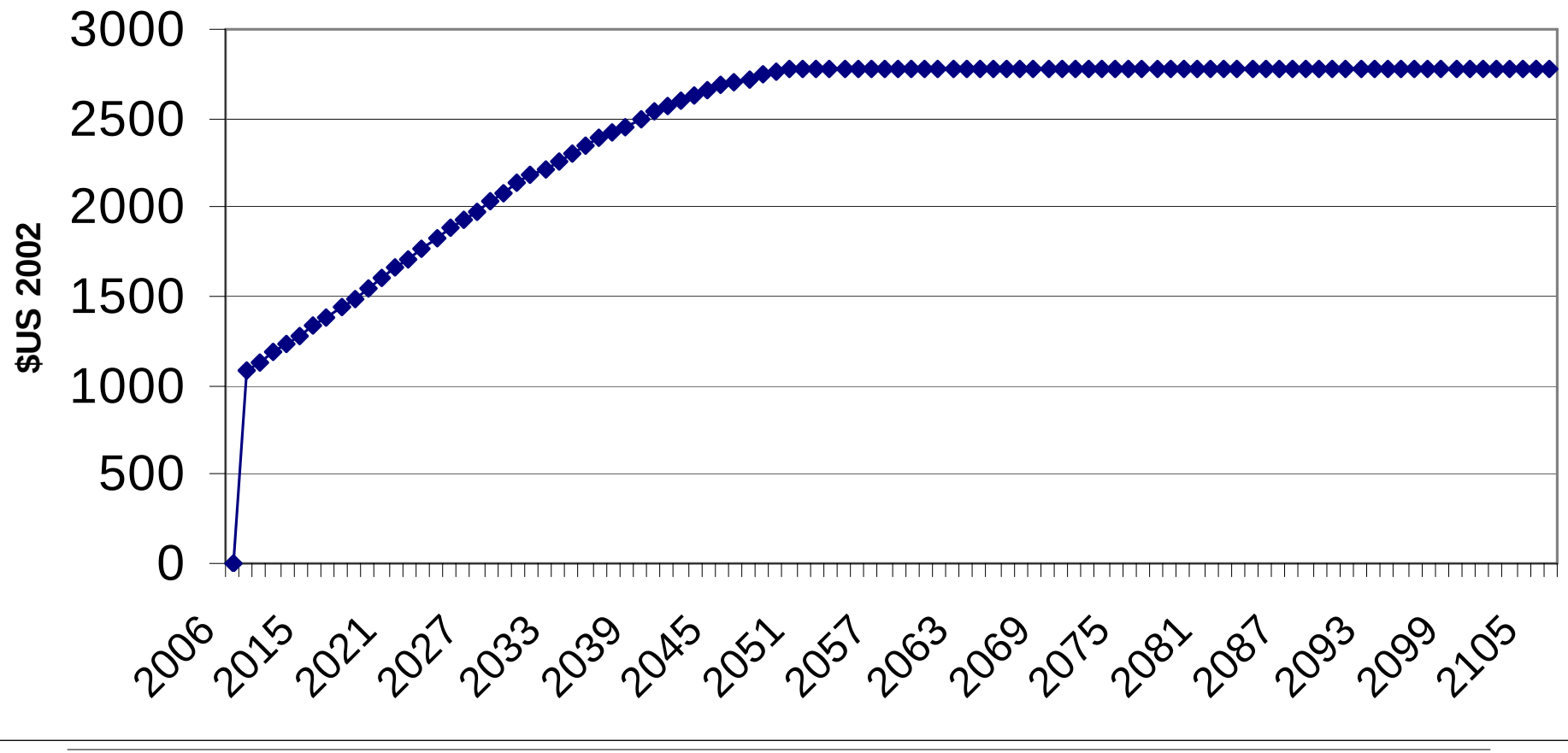


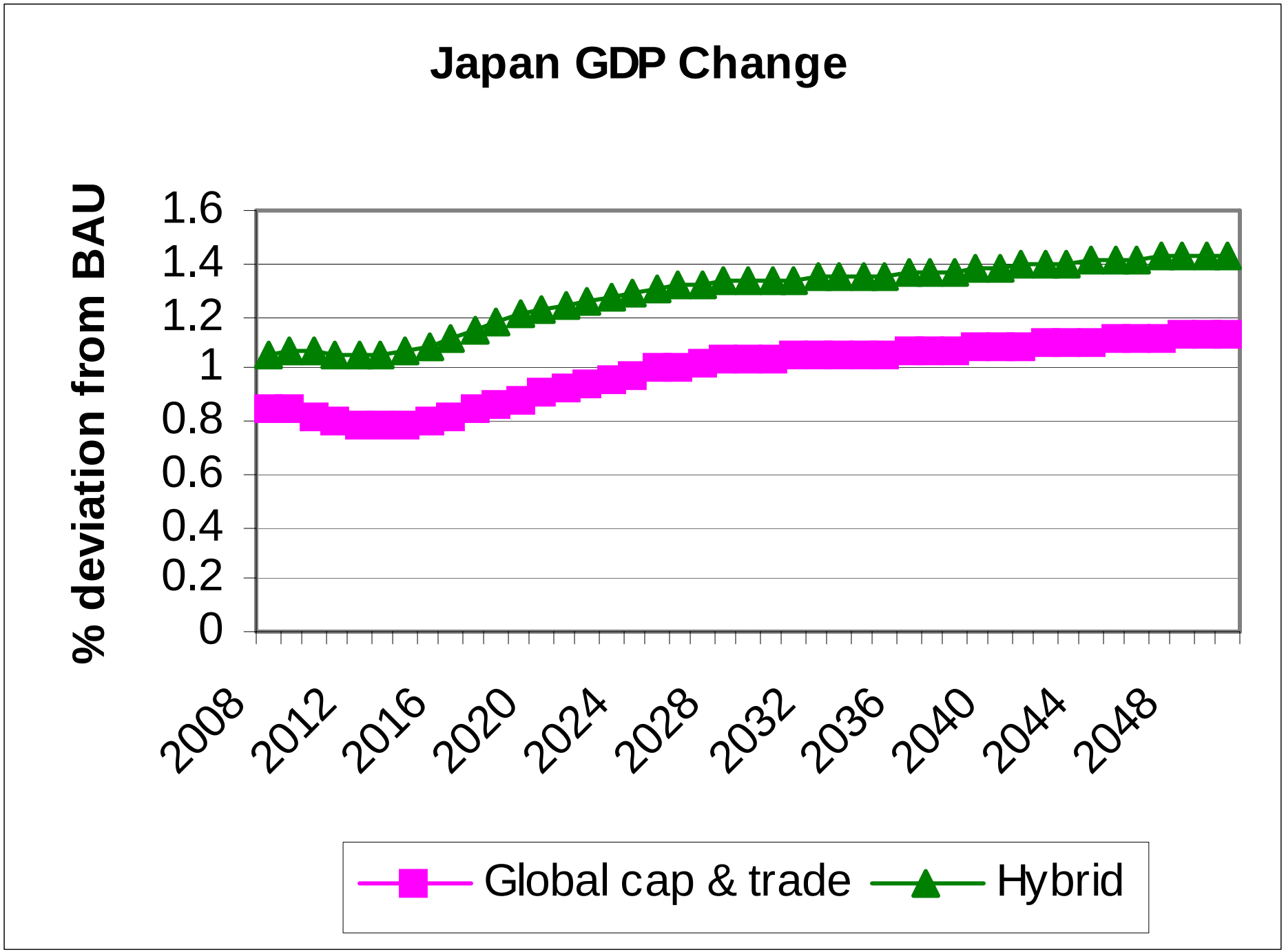
Figure 4 : Stylized Value of Long Term Permits

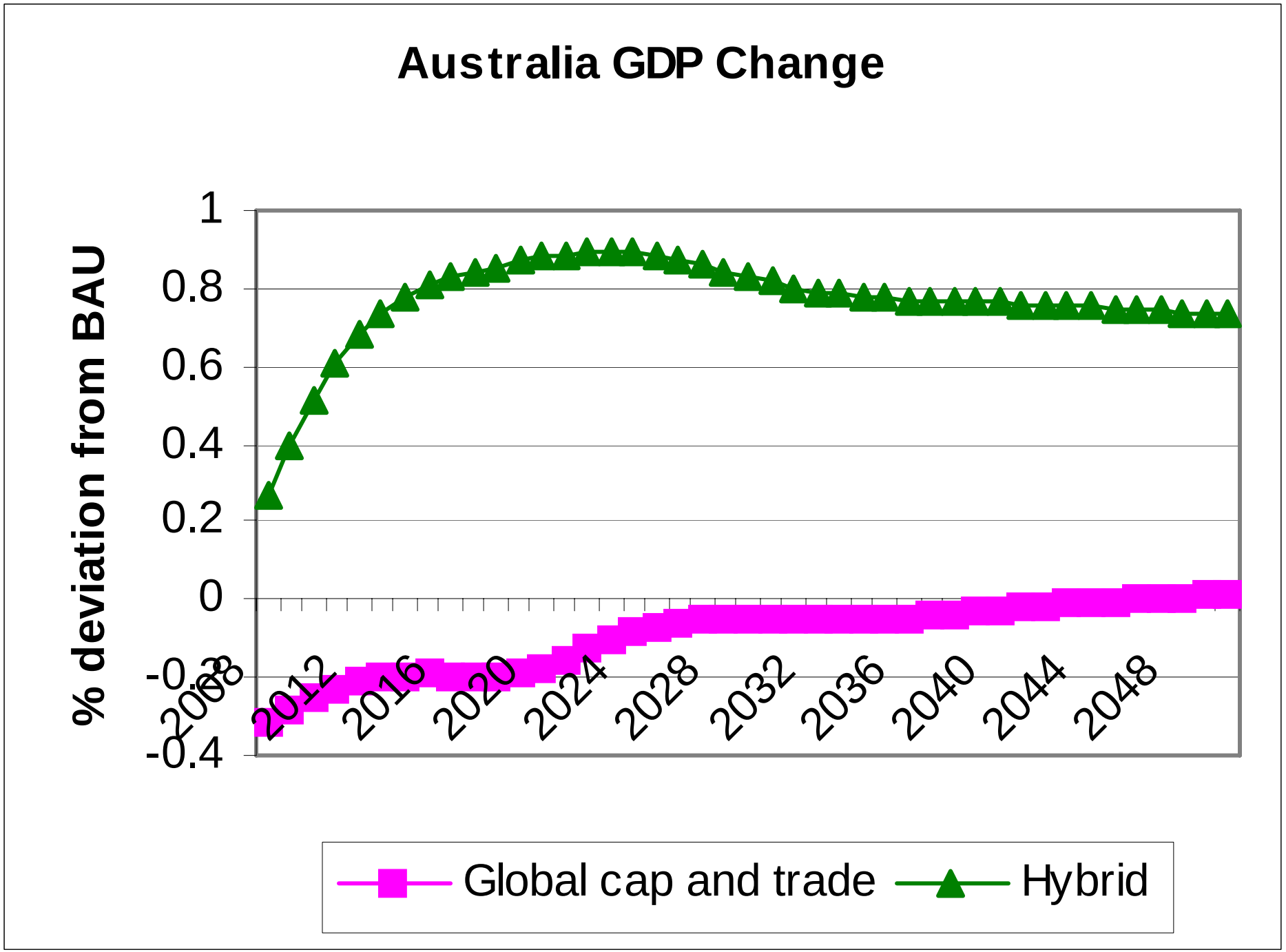
(Assuming r=5%)



Impact of Uncertainty in shocks

- **Suppose developing countries (China, India, LDCs) have 3% per year higher productivity growth from 2003 to 2020**


Japan GDP Change
% deviation from BAU
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
2008
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Global cap & trade
Hybrid

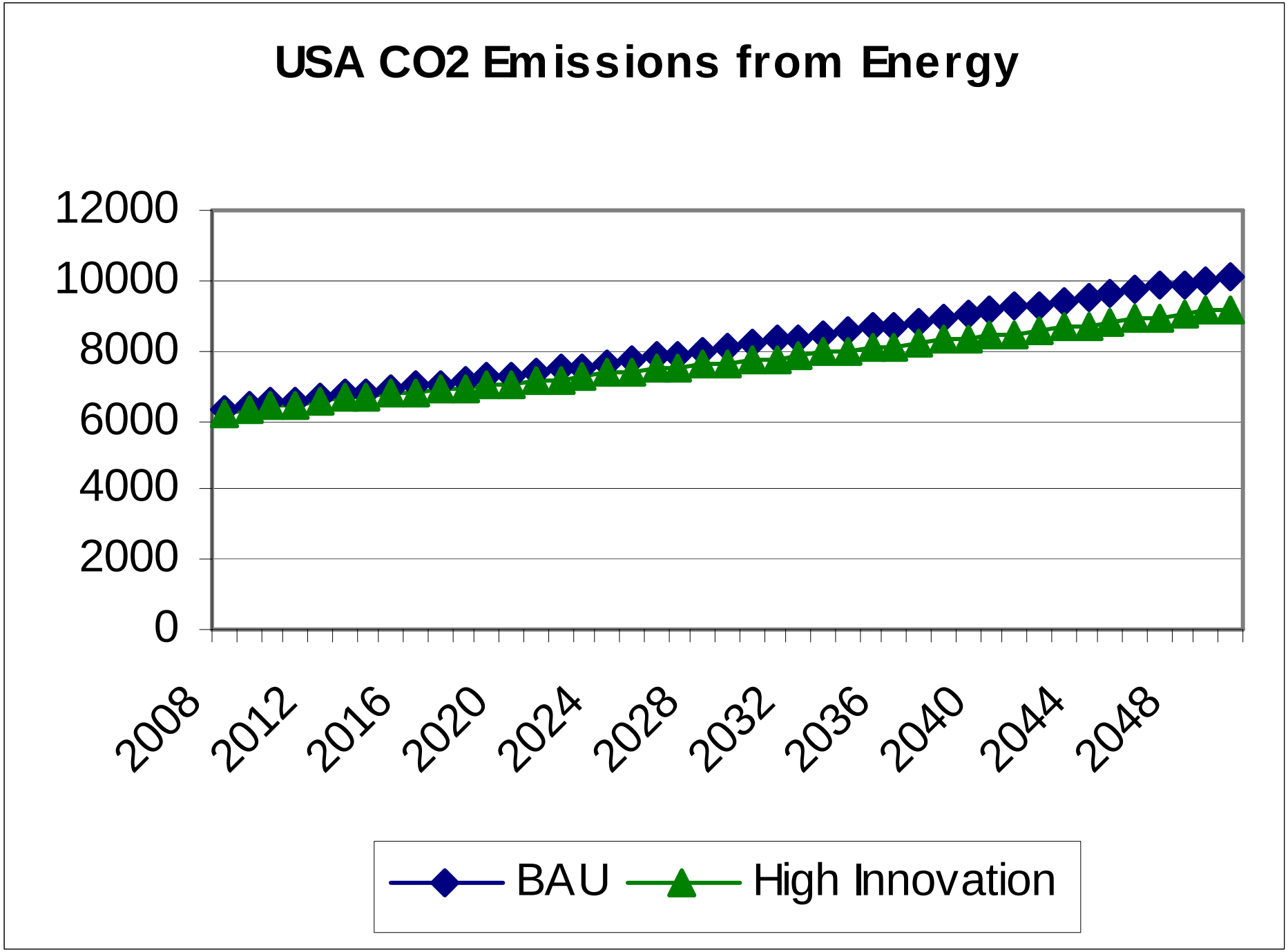

Australia GDP Change
% deviation from BAU
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
2008
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Global cap and trade
Hybrid

Impact of Uncertainty

- **Far greater problem under a rigid cap and trade system**
- **Could be sufficient to prevent any effective international agreement**
- **Uncertainty even greater for developing countries**
- **A hybrid approach enables countries to negotiate targets knowing the maximum costs to be incurred and the rules for adjustment over time**

Accelerated Deployment of Advanced Technology

- **BAU results assume technology evolves at historical rates**
- **What if this could be accelerated?**
- **Modeled as fossil fuel augmenting technical change (reduce the fuel mix in electricity generation away from fossil fuels).**


USA CO2 Emissions from Energy
12000
10000
8000
6000
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2008
2012
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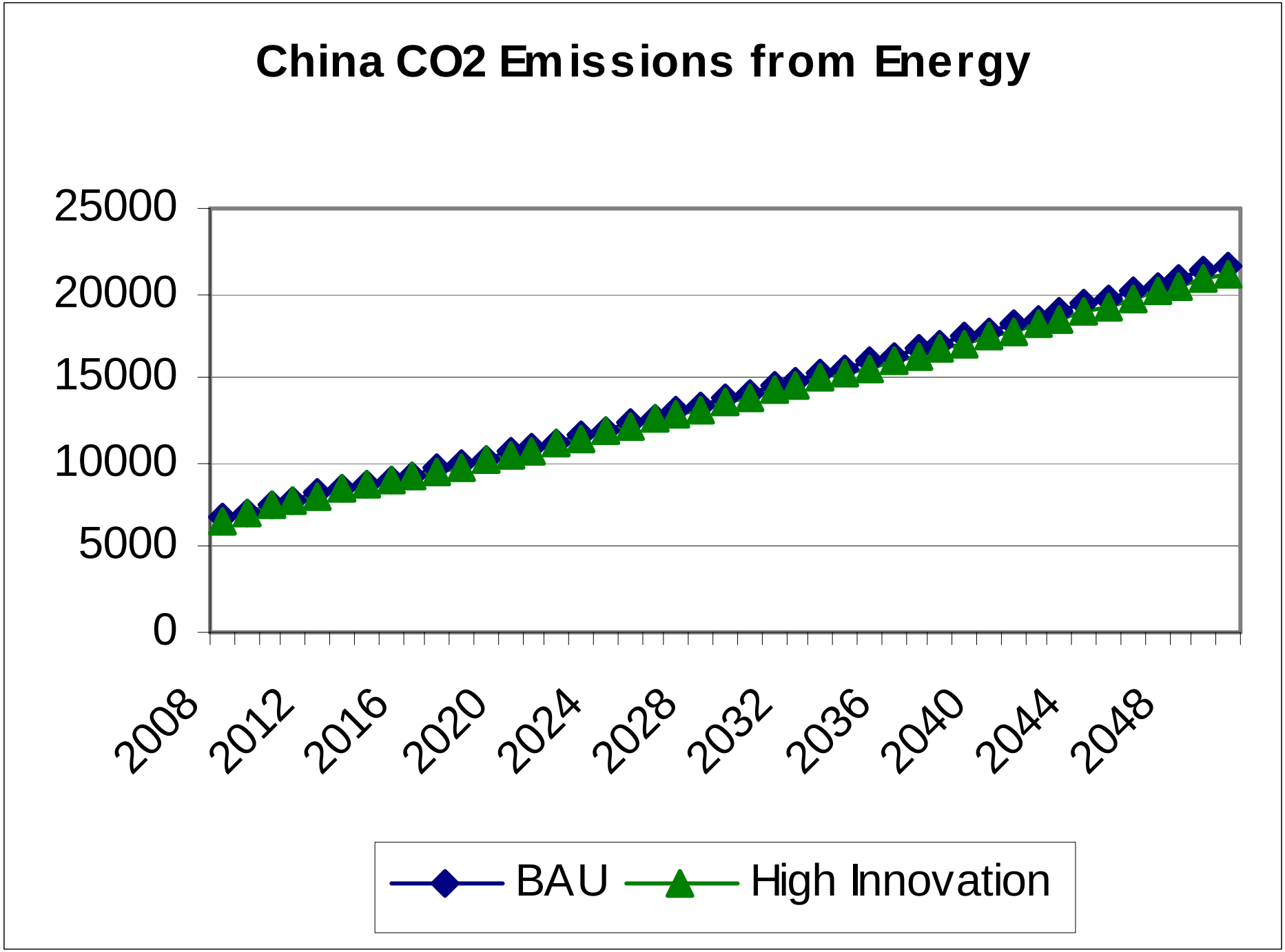
2040
2044
2048
BAU
High Innovation


China CO2 Emissions from Energy
25000
20000
15000
10000
5000
0
2008
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
BAU
High Innovation

Conclusions for the Global Debate

- **Conventional targets and timetables approach without flexibility does not deal with uncertainty (particularly for developing countries)–**
  - ⇨ Forces focus on dividing up a rigidly fixed pie

- **Need a policy of agreed actions through national frameworks coordinated through a common carbon price in each system**

- **The international framework needs to balance the global target with the relative economic costs across countries of achieving that target**

Conclusions for Policy

- **Need to encourage research and development in advanced technology in energy generation and energy use alongside the international climate framework**

- **Advanced technology likely to be more quickly deployed under the incentives created by the Hybrid approach**

- **Need to build in deforestation urgently**

What Australia Should Do

- **A conventional cap and trade system is not adequate for Australia**
  - ⇨ Excessive short term price volatility
  - ⇨ Cannot control the short term costs while evolving into a global system
  - ⇨ Does not provide the capacity to manage long term climate risk
  - ⇨ Revenue should be in the hands of the innovators and the population and not the governments, especially not the state governments
  - ⇨ Does not fit with the actual policies being explored in the post Kyoto world.

Key Message

- **Australia should be at the forefront of the design of a global system that includes the major emitters but based on comparative advantage not arbitrary targets and cap and trade systems**

- **Most of the cost to Australia of a carbon target for the world comes from what other countries do not what is done in Australia**

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