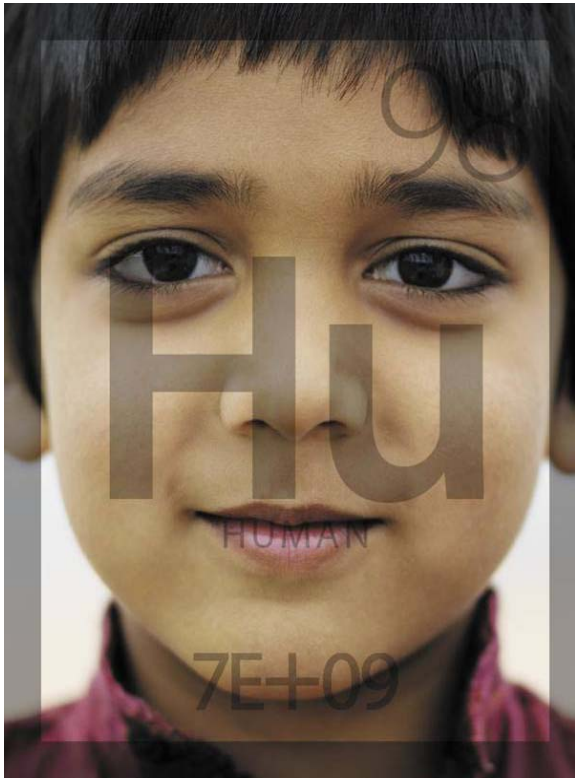
The Dow Chemical Company and Climate Change

- Introduction
- Dow's Position on Energy & Climate Change
  - Slow, Stop, Reverse
  - Stabilization Wedges
- Greenhouse Gas Abatement
  - History
  - Future Plans
- Policy & Advocacy Strategy
- Summary

Jennifer Bowman
January 2010

The Dow Chemical Company

- A diversified chemical company
- Sales of 57.4 Billion USD in 2008
- 46,000 employees in 2008
- 160 countries
- In 2009 acquired Rohm & Haas



Setting the Standard for Sustainability

Smart Solutions

Our technologies enable our customers, and their customers, to develop products and services for a more sustainable future.

Innovations For Tomorrow

We contribute to the sustainability of society and our planet by developing innovative technologies for current and future markets.

Responsible Operations

Our infrastructure has a positive impact on our company, our communities and ourselves; our operations are a model for others, wherever we operate.

Partners For Change

We are leaders in advancing all aspects of sustainability, openly collaborating with customers, suppliers, communities, civil society and governments.

Creating Products from Energy & Feedstocks

Oil & Gas

- Feedstock
  Ethane, Propane
  Butane, Naphtha
- Steam
- Power

The Dow Chemical Company

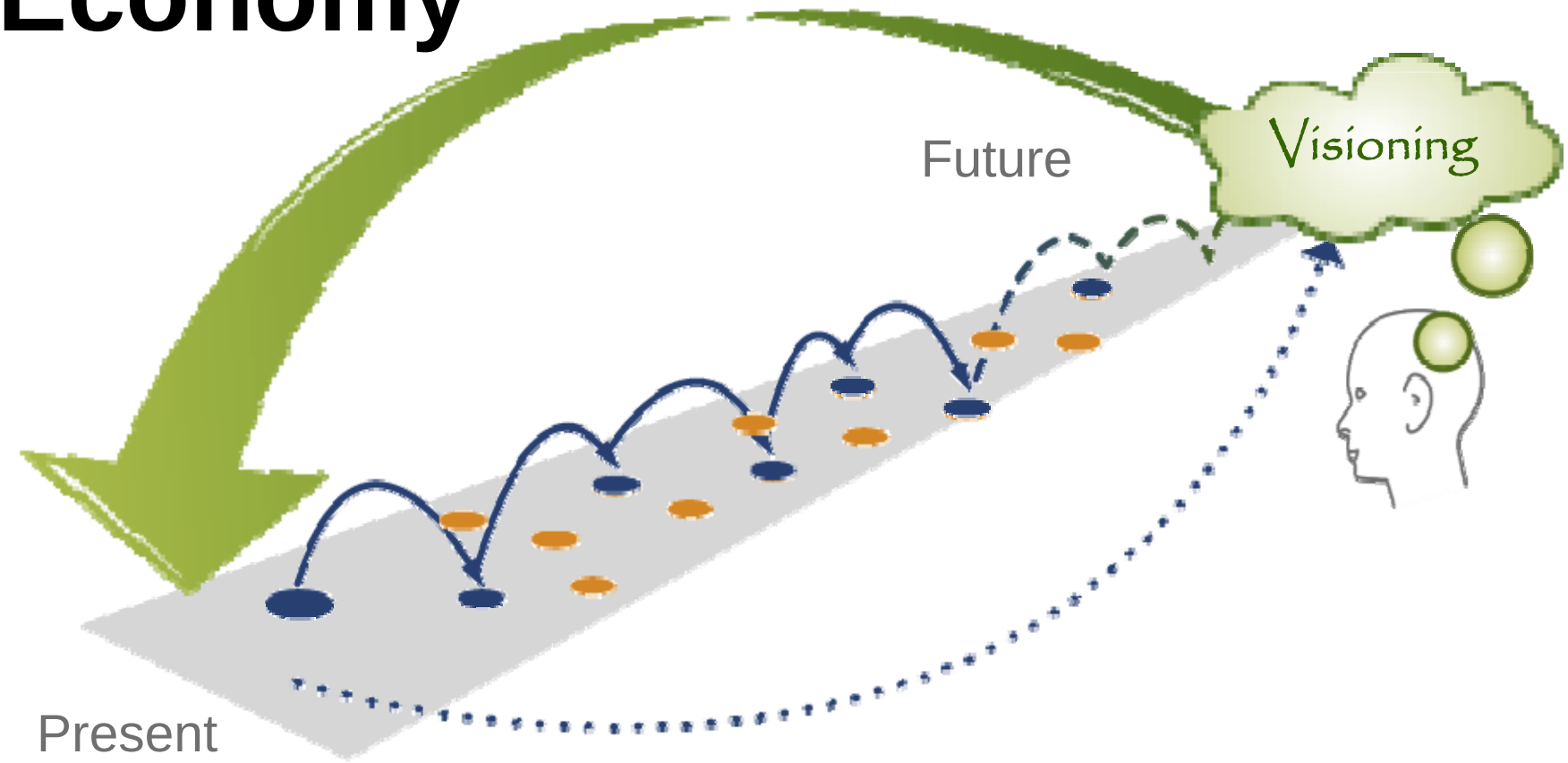
- 2008 Total Hydrocarbons Feedstocks & Energy
  - $27.3 Billion USD
    - $5.9 Billion USD higher than 2007
    - $3.2 Billion USD lower volume than 2007

- 2008 Global Greenhouse Gas Emissions
  - Total - 35.2 Million metric tons
    - Scope 1 Emissions – 27.7 million metric tons
    - Scope 2 Emissions – 7.5 million metric

The Dow Chemical Company Position

- Dow accepts the U.N. Intergovernmental Panel on Climate Change's (IPCC) conclusion that it is very likely that human activities are contributing to climate change.

Sustainable Vision ➔ Low Carbon Economy



Dow's Path to a Strategy and Position

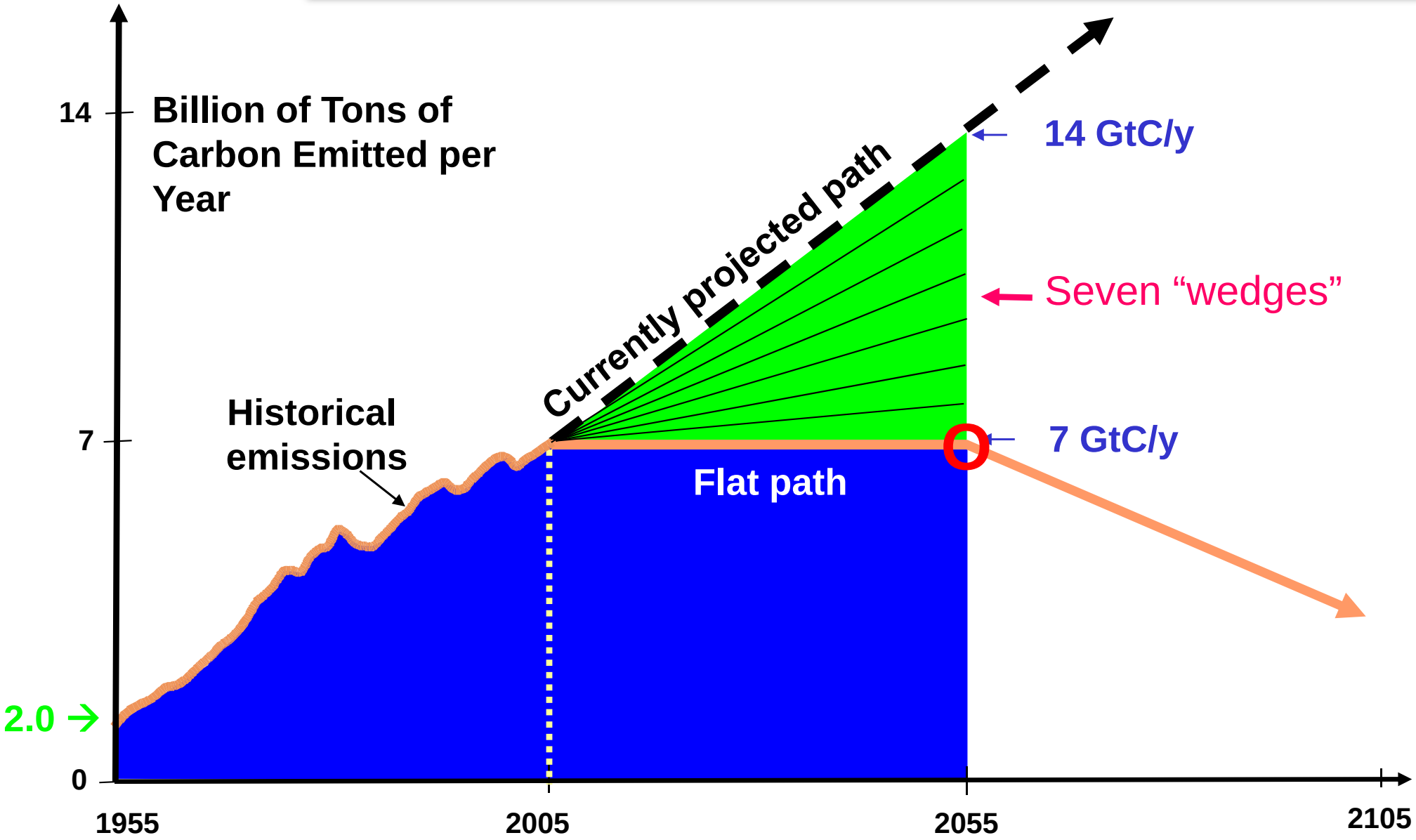
In 2004, Socolow and Pacala published two now famous concepts.

- ***Slow, Stop & Reverse***
- ***Stabilization Wedges***

Scientific American, September 2006

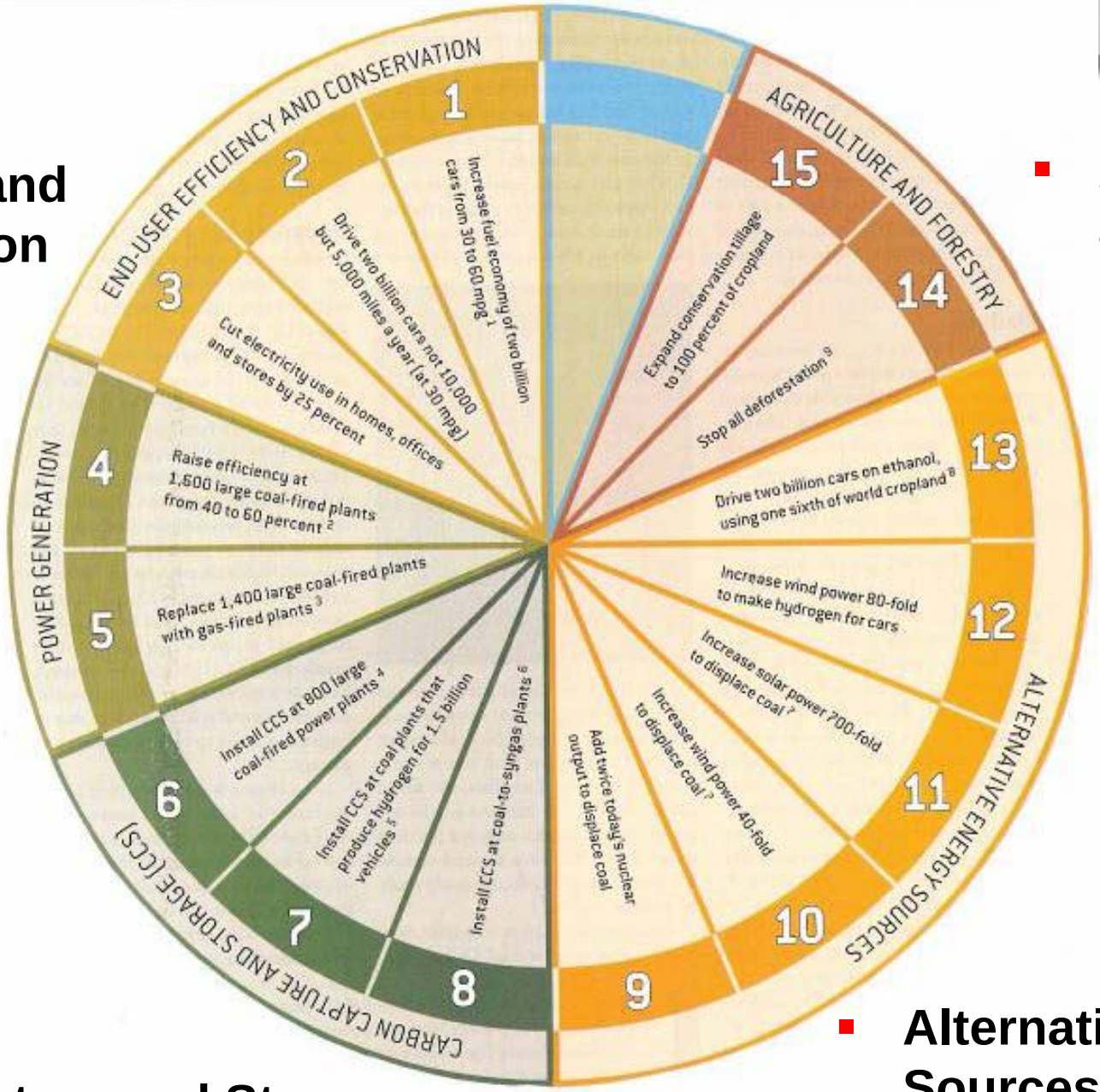
Science, August 2004

Wedge Stabilization Model



Wedge Solutions

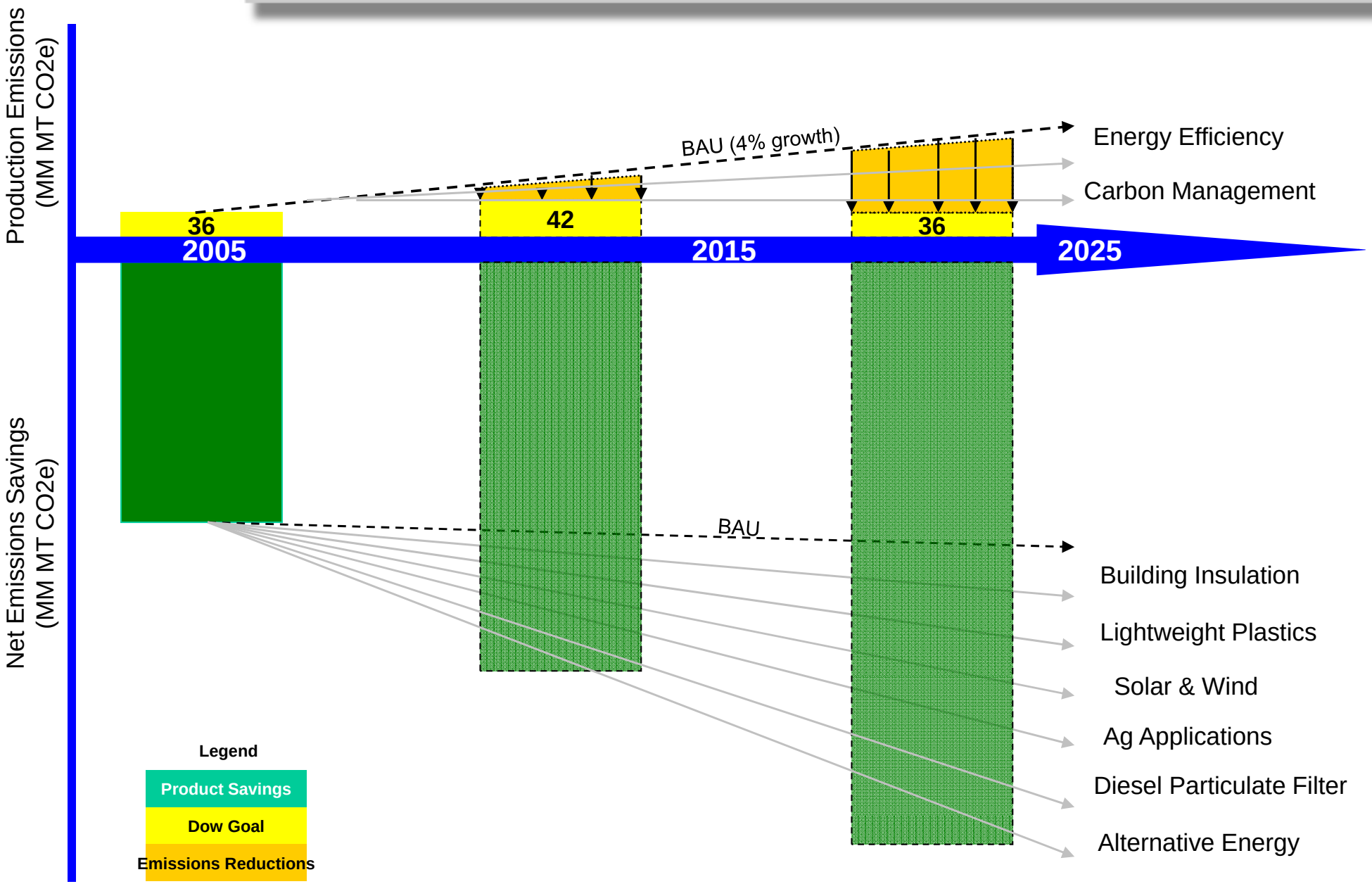
- **End-User Efficiency and Conservation**
- **Power Generation**
- **Carbon Capture and Storage**



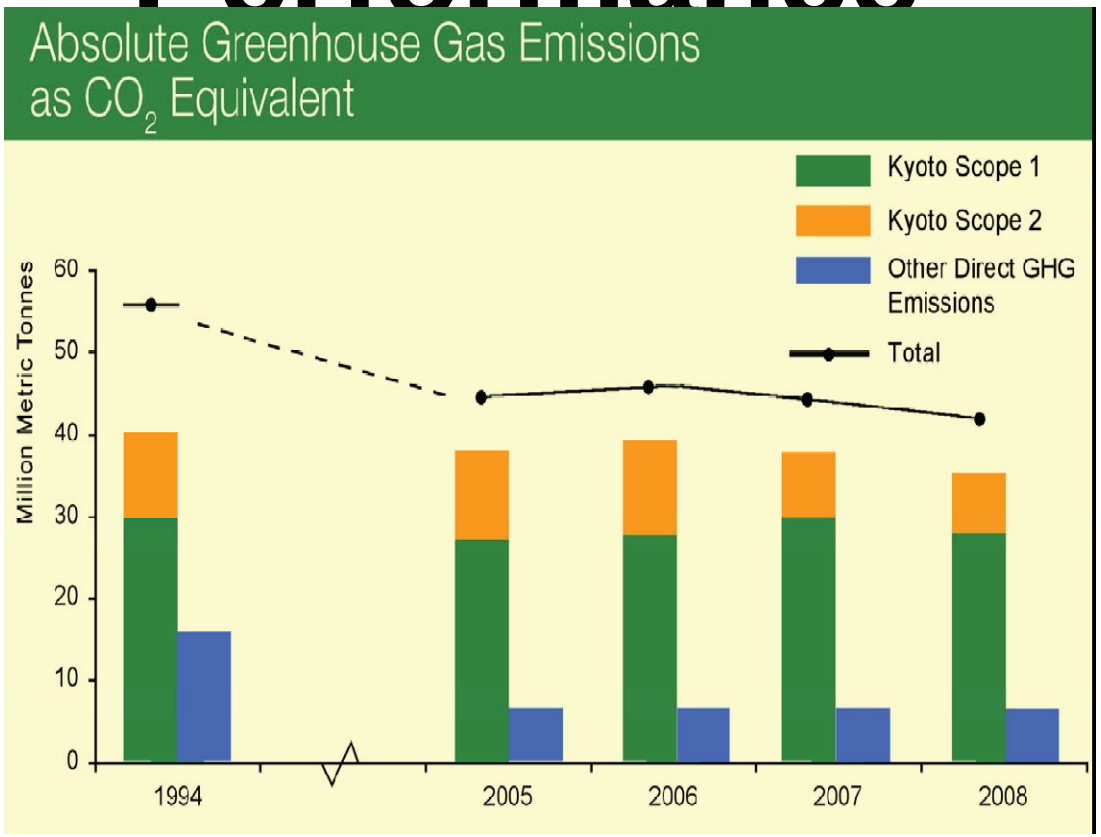
- **Agriculture and Forestry**
- **Alternative Energy Sources**

Source: Socolow & Pacala, 2006

Dow Solutions to Address Climate Change



Dow's GHG Historic Performance



- Since 1994, Dow has saved the equivalent to **the energy needed to generate the electricity used in all the residential houses in California for one year**.
- Dow's energy efficiency program has resulted in energy savings of **$8.6 billion dollars**
- These reductions prevented **86 million metric tons** of CO2 from entering the atmosphere.

Energy Efficiency – Ready Now!

Emissions reductions from Dow Insulation are 7 times greater than our corporate emissions

Sugar Cane to Polyethylene

Economic, Social, Environmental Benefits

- **Dow project in Brazil**
  - Less fossil resources than traditional hydrocarbon processes
  - Biomass (bagasse) produces heat, electricity and steam for ethanol, ethylene and polyethylene plants
- **Sustainability Profile**
  - Produces 1/7th the amount of CO_2
  - Most “waste” is used in the process
  - Harvesting rainwater
  - Trees adjacent to fields reduce soil erc
  - Recyclable using existing infrastructure
  - Economic development

Sunlight Into Electricity

Economic, Social, Environmental Benefits

- **Dow Electronic Materials provides new metallization technologies for high efficiency solar cells**
  - Increase solar cell efficiency by as much as 0.3-0.6%.
    - Each 0.1% improvement can result in approximately $500,000 in savings per year for our customers.
  - Reduces cost of solar cell technology for consumers
  - Faster plating speed
- **Sustainability Profile**
  - Cyanide-free
  - Higher cell efficiencies translate into lower costs and promote growth of the solar energy sector

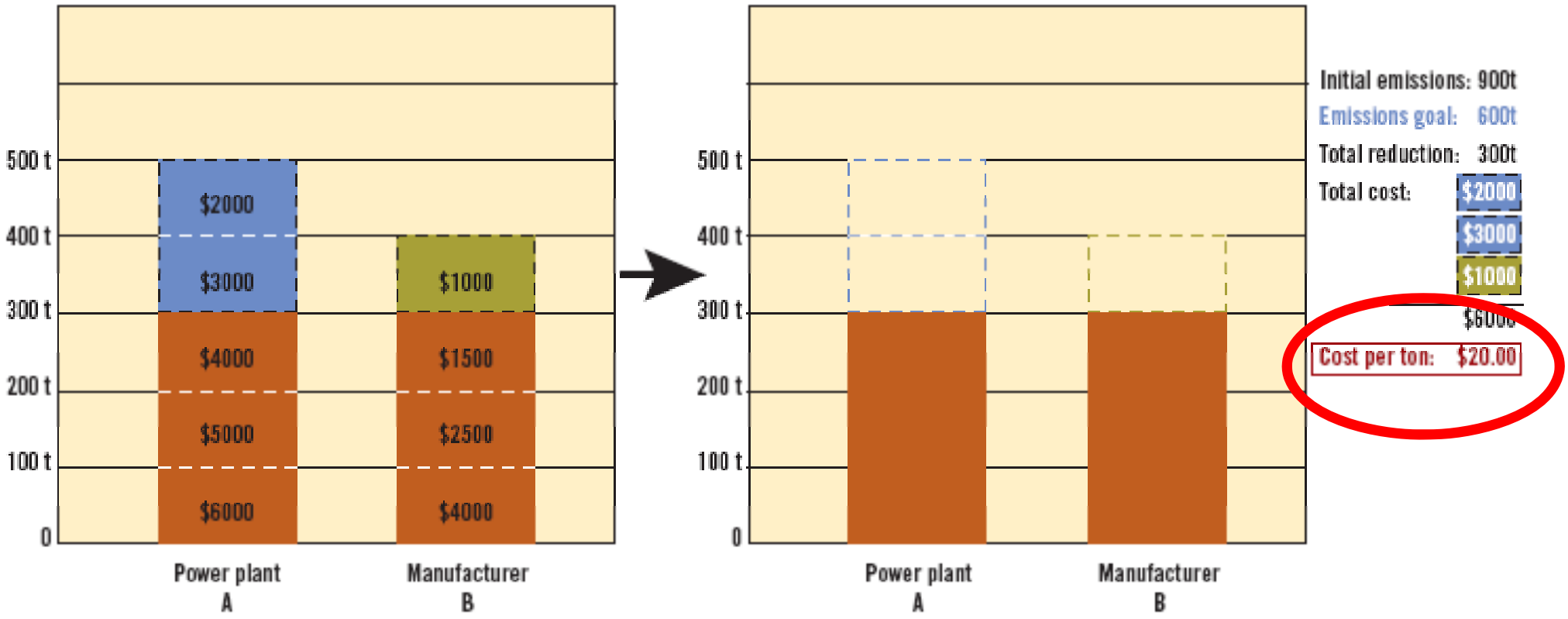
Public Policy & Regulatory Certainty

Dow active in US and International Policy Discussions

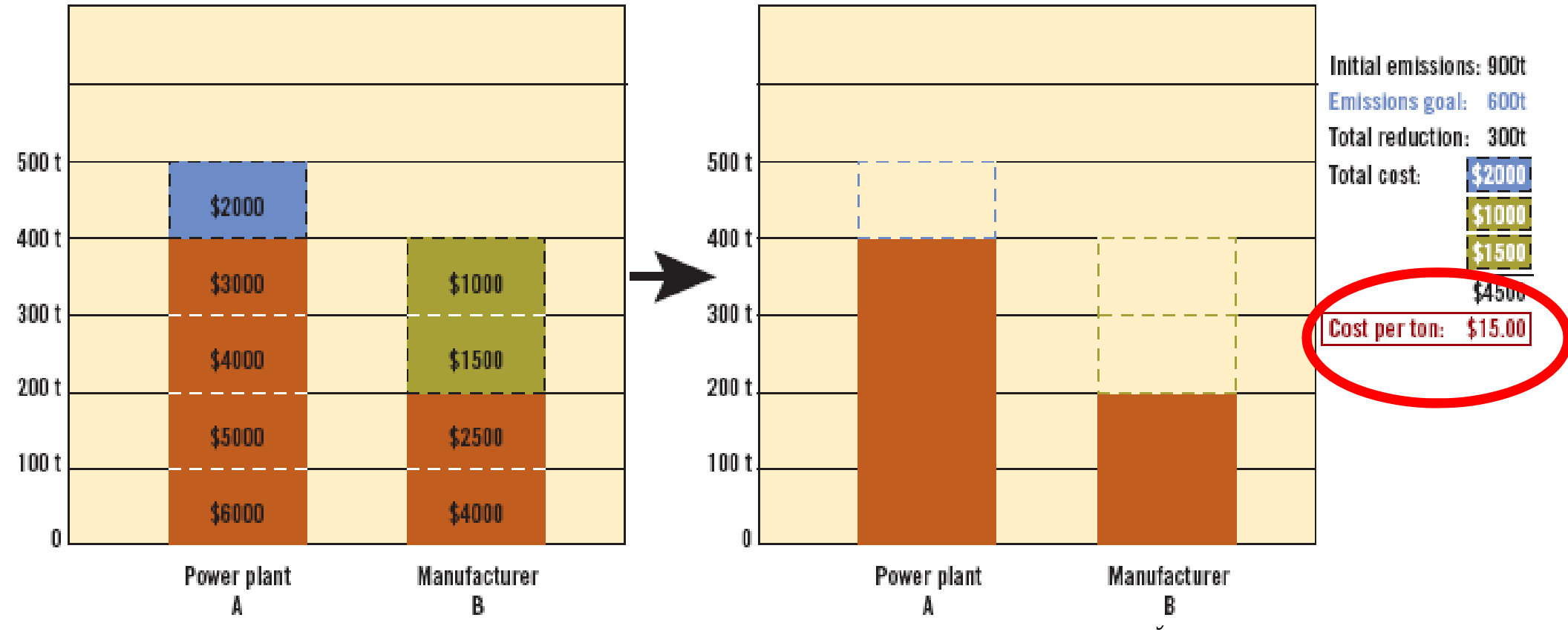
- Member of US CAP
- Dow's Energy Plan for America
- Support Legislative Action
  - Climate change policy must set an orderly and predictable schedule for greenhouse gas (GHG) reductions and establish a market-based system in which the regulated sectors can implement the lowest cost solutions, maximizing the environmental impact

EPA "command and control"

Regulatory Authorities Direct Emissions Limits
Environmental Objectives are met, but costs are higher



Cap and Trade



Summary

- Dow accepts the U.N. Intergovernmental Panel on Climate Change's (IPCC) conclusion that it is very likely that human activities are contributing to climate change.
- We believe that the long term cost of inaction is higher than addressing the issue in the near term through policies that are economically sustainable and environmentally effective.
- The Chemical Industry is a key enabler for Greenhouse Gas reduction innovation
- We are advocate for environmentally effective and economically sustainable policy.

Q&A

More Climate Change Information

Dow's Position/Commitments

Climate Change: http://www.dow.com/commitments/pdf/dow_energy_vision.pdf
Dow's Energy Plan for America: http://news.dow.com/dow_news/pdfs/dow_energy_plan.pdf

Socolow and Pacala:

http://www.sciam.com/carbon/0906050.pdf

Climate Change Science:

Who is the IPCC?
http://www.ipcc.ch/about/index.htm
What do they say?
http://www.ipcc.ch/ipccreports/assessments-reports.htm

The UN Framework Convention on Climate Change:

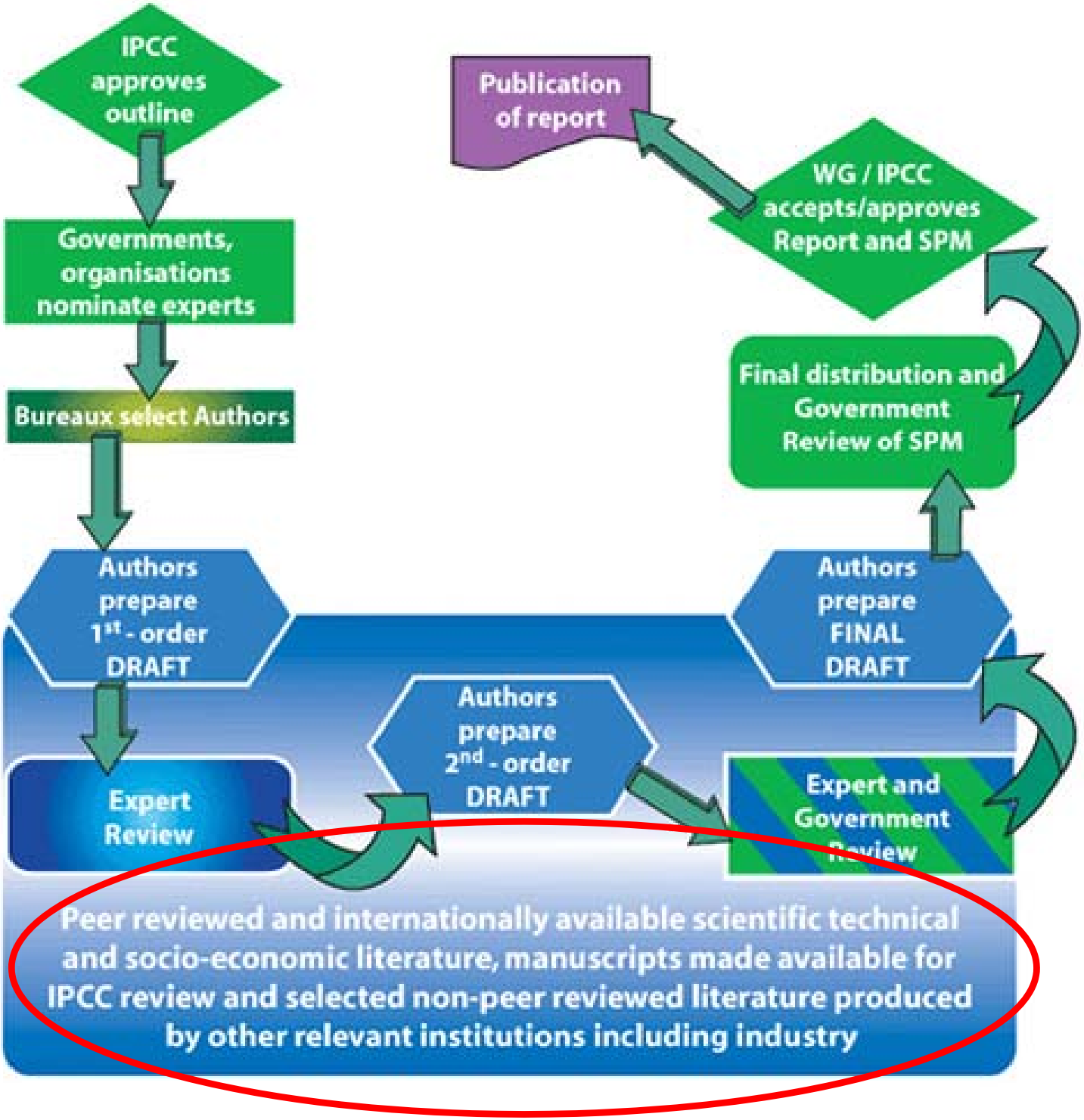
Homepage: http://unfccc.int/2860.php/
Glossary of Terms for GHG and the players in context of the Framework http://unfccc.int/essential_background/glossary/items/3666.php
The Kyoto Protocol. http://unfccc.int/kyoto_protocol/items/2830.php
Definition of Parties and Observers http://unfccc.int/parties_and_observers/items/2704.php
Bali Roadmap (for parties and observers):
Ad-hoc working group on Long Term Cooperative Action http://unfccc.int/meetings/items/4381.php
Ad Hoc working group on Further Commitments for Annex 1 Parties under Kyoto http://unfccc.int/kyoto_protocol/items/3878.php

Wikipedia Definitions for Trading Schemes/Reporting -- (where we will or may have to report our GHGs):

The Climate Registry: http://en.wikipedia.org/wiki/The_Climate_Registry
ETS: http://en.wikipedia.org/wiki/European_Union_Emission_Trading_Scheme
RGGI: http://en.wikipedia.org/wiki/RGGI
CCX: http://en.wikipedia.org/wiki/Chicago_Climate_Exchange
WCI: http://en.wikipedia.org/wiki/Western_Climate_Initiative
MGGA: http://en.wikipedia.org/wiki/Midwestern_Greenhouse_Gas_Accord

The UNIPCC

The role of the IPCC is to *assess on a comprehensive, objective and transparent basis* the latest scientific, technical and socio-economic literature produced worldwide relevant to understanding the scientific basis of climate change, its potential impacts and options for adaptation and mitigation



DOW

UNIPCC Process for Publishing Assessment Reports

Published on ~7 yr cycle

2013 is target release for AR5.

Assessment Reports available online

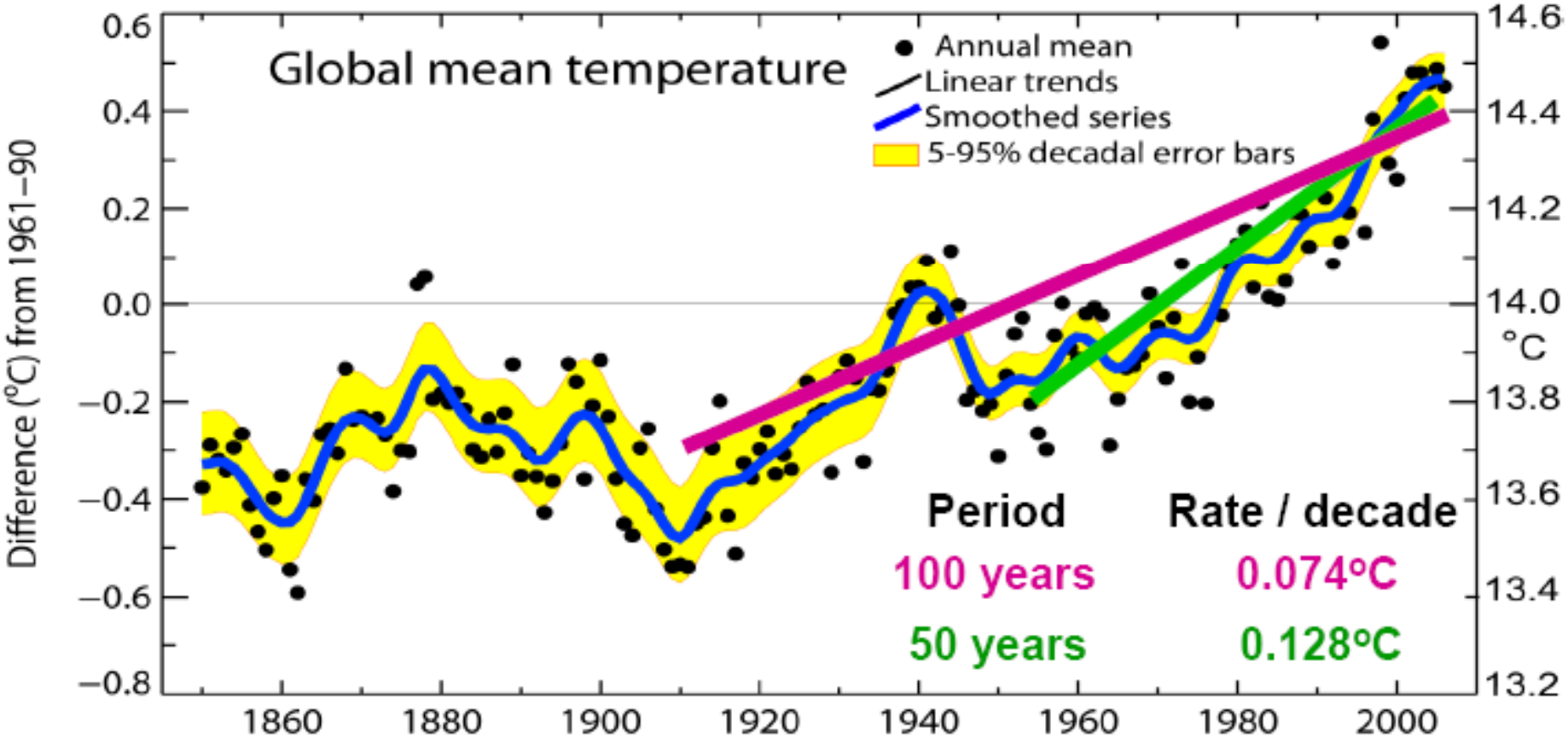
UNIPCC Endorsement within Scientific Community

Over recent years the IPCC has effectively become **voice of the mainstream scientific community**

In the US, the IPCC has been repeated vetted and endorsed by:

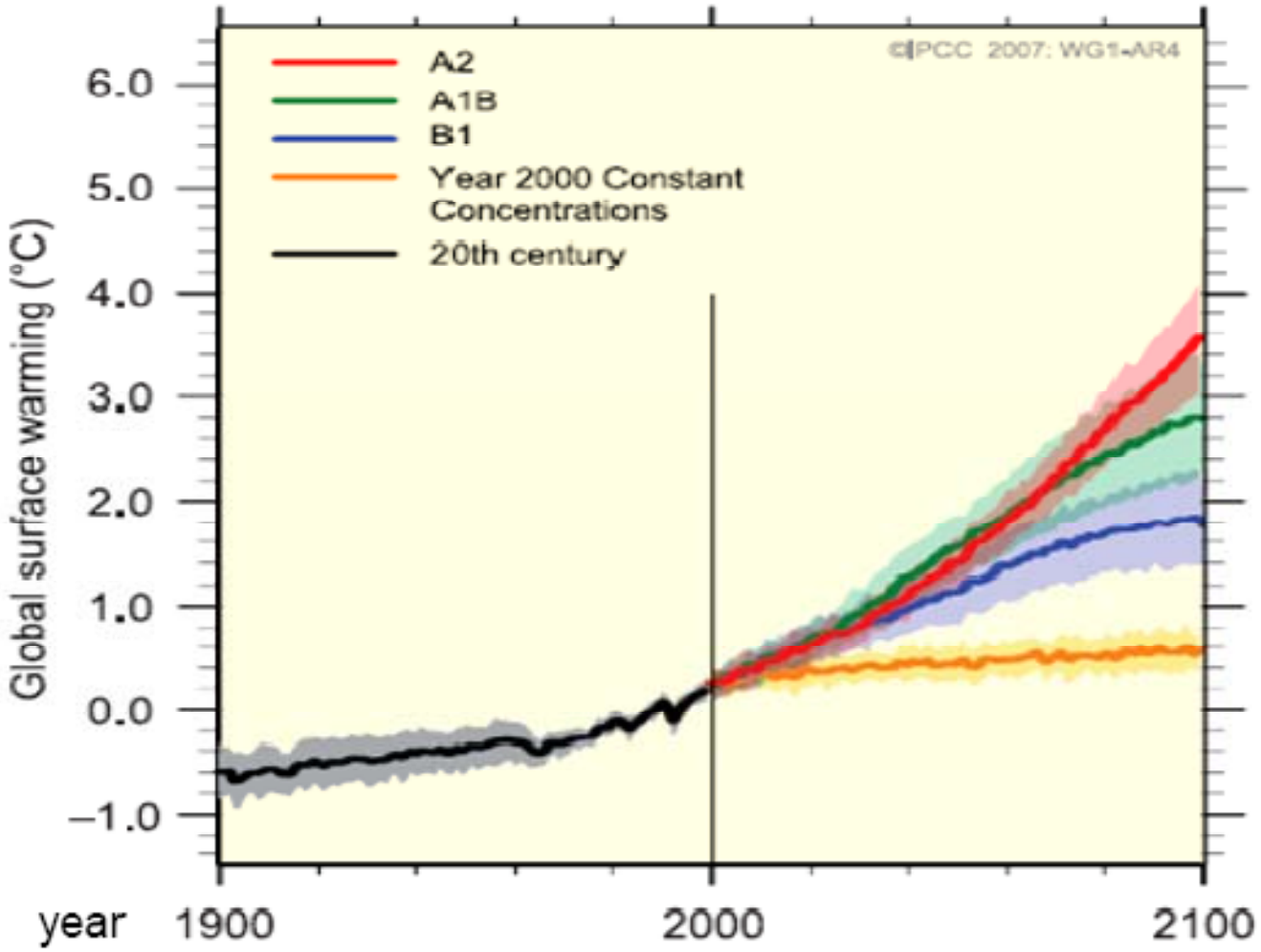
- The National Academy of Science
- The American Meteorological Society
- The American Geophysical Union
- The American Association for Advancement of Science

Changes in global average surface temperature



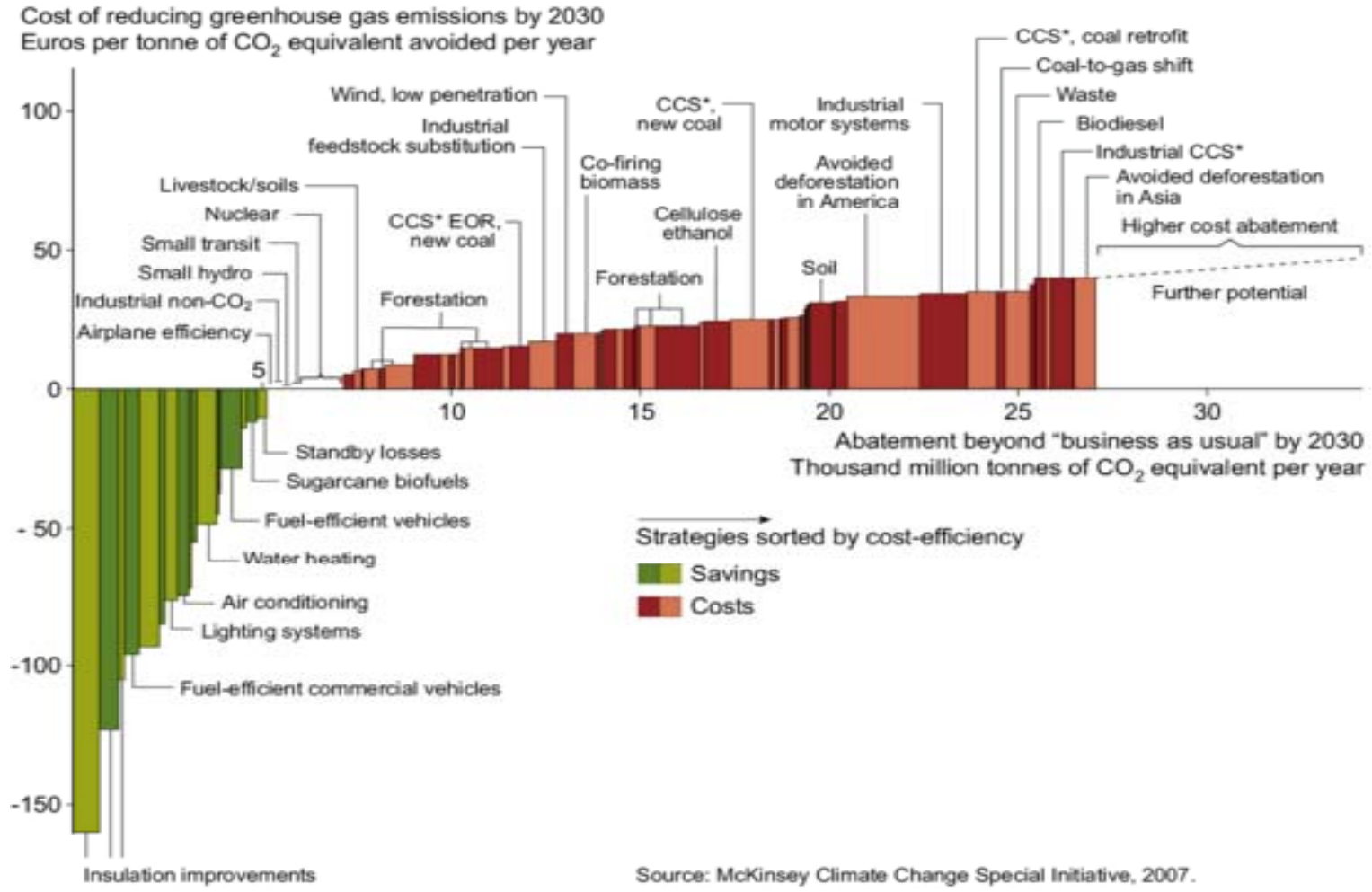
Eleven of the last twelve years rank among the twelve warmest years in the instrumental record of global surface temperature

Ranges for predicted surface warming



Continued emissions would lead to further warming of **1.1ºC to 6.4ºC** over the 21st century (best estimates: **1.8ºC - 4ºC**)

GHG Future Abatement – The McKinsey A



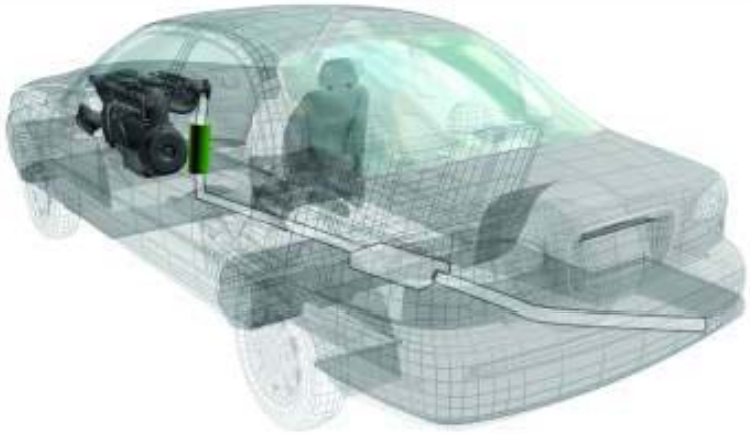
Dow and the Wedge

Wedge One

Increase fuel economy of two billion cars from 30 to 60 mpg

Dow Contributes Via:

- Lightweight plastics in vehicles
- Diesel Particulate Filter



Wedge Three

Cut electricity use in homes, offices and stores by 25 percent

Dow Contributes Via:

- Dow Styrofoam as building insulation: saves hundreds of millions mt of CO2 emissions per year

Dow and the Wedge

Wedge 11

Increase solar power 700-fold

Dow Contributes Via:

- Integrated photovoltaic cell for building applications
- Solar farm at Dow Pittsburg, California facility
- Nevada One solar plant

Photo courtesy of Power Light Corporation

Wedge 13

Using ethanol

Dow Contributes Via:

- World-scale facility to produce sugar cane to ethanol to ethylene

Dow Advocacy for Legislative Solution

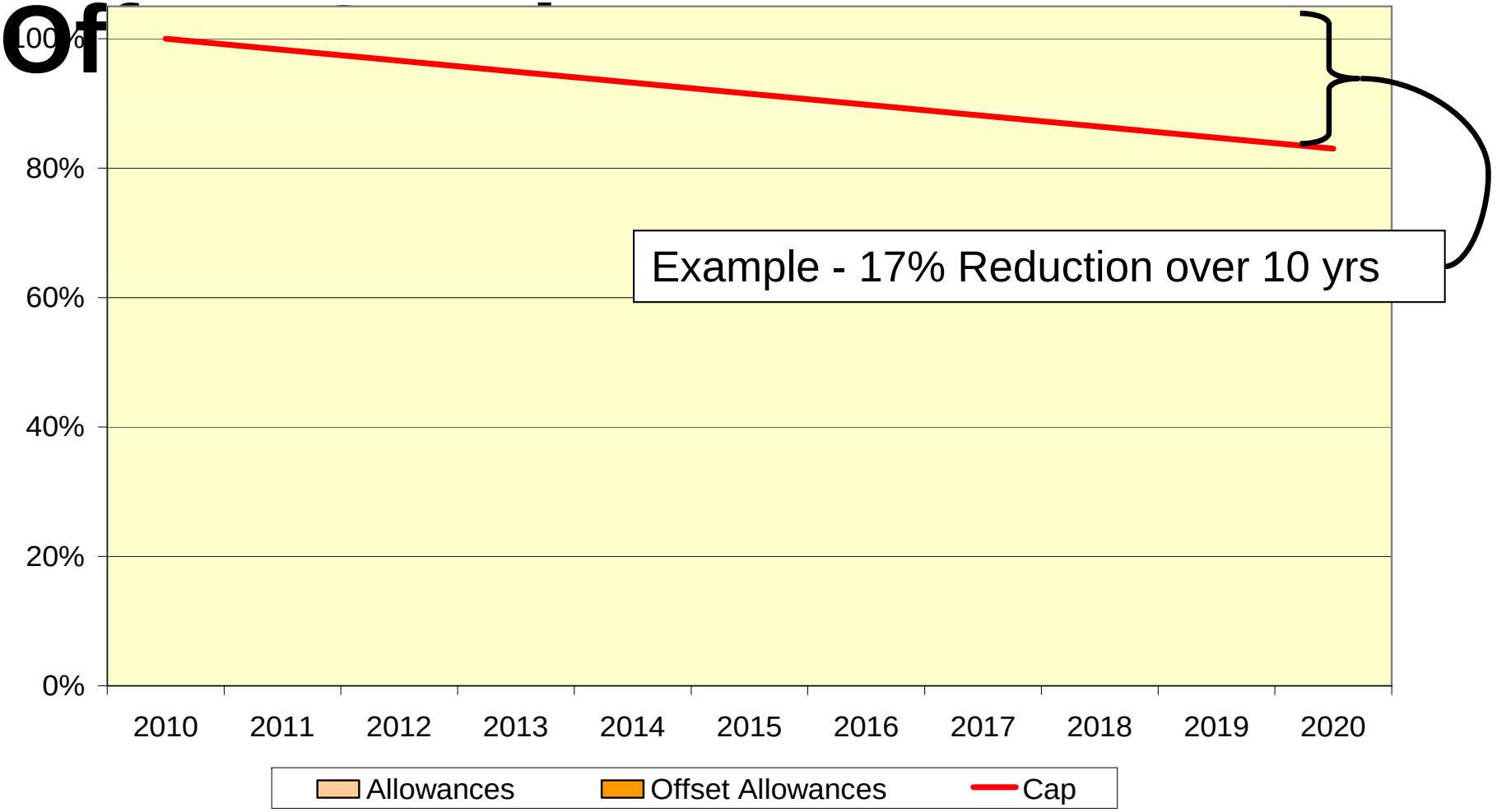
Five Major Concerns for TDCC

1. Credit for non-emissive use of feedstock
2. Free allowances for Energy Intensive / Trade Exposed Industry
3. Cost Containment through Sufficient International & Domestic Off-sets
4. Policy Measures which reduce the “dash to gas”
5. Complimentary Policies (i.e. Energy Efficiency)

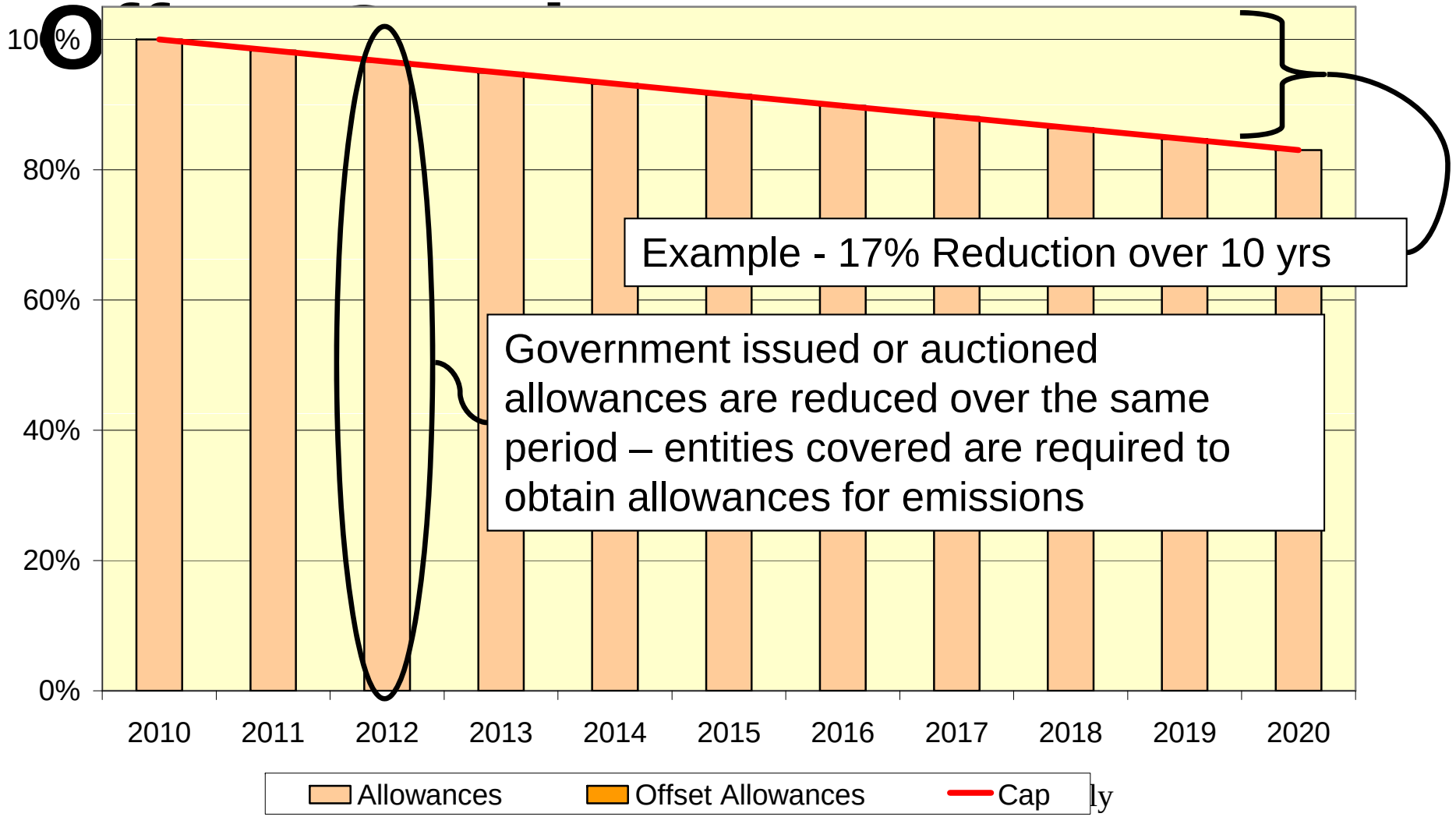
The rules are made

- Definition of which sectors/industries/sources are subject to compliance
- A schedule for emissions reduction is set
- Criteria for Allowance distribution are determined
- Rules are established allowing emissions reductions in sectors not governed by the cap (domestic or international) to be used for compliance

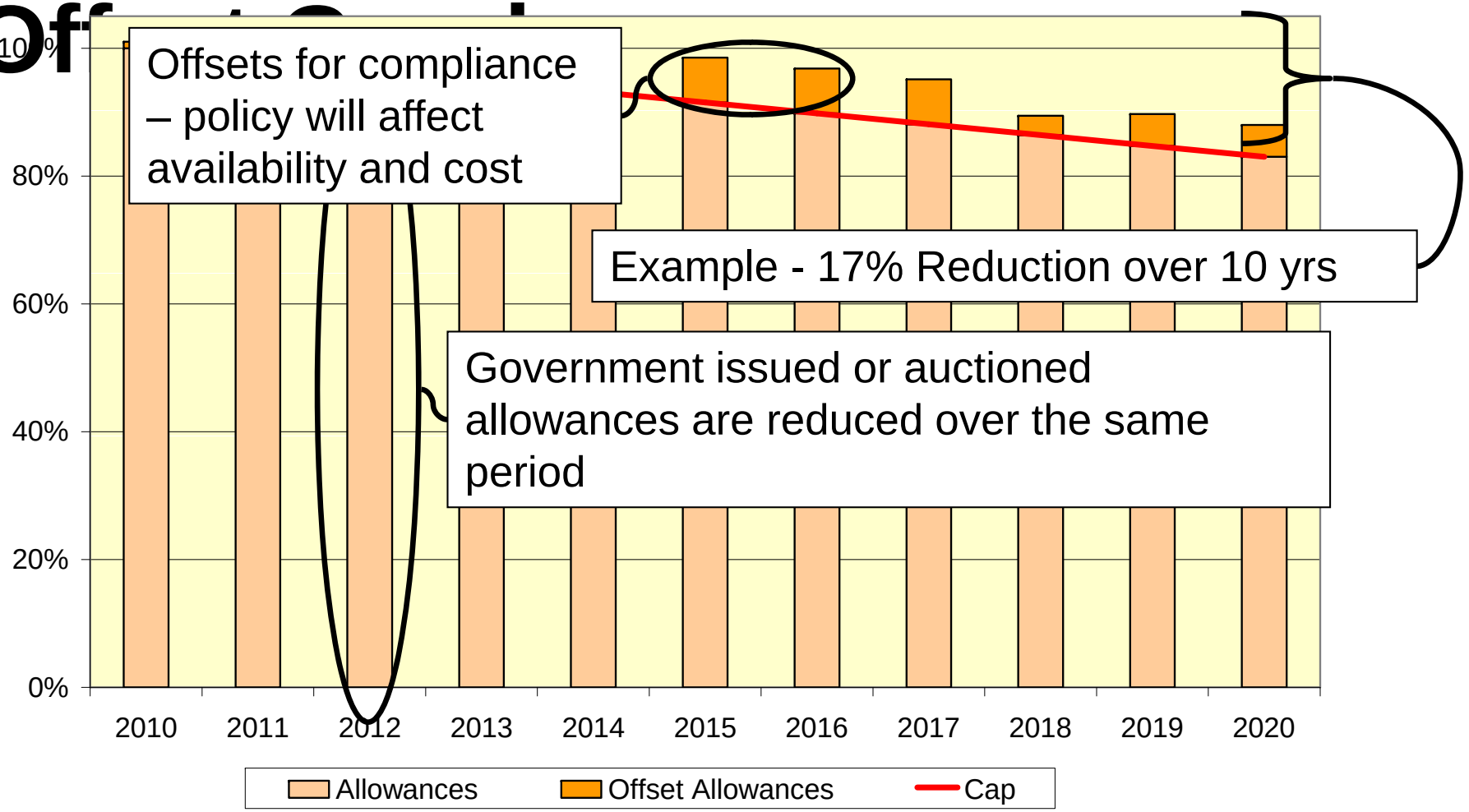
Simple Cap, Allowance & Of



Simple Cap, Allowance & O



Simple Cap, Allowance & Off



Carbon Leakage

- Definition: Emissions outside the cap increase as a result of less stringent regulations in another country or region
- Undermines environmental effectiveness and economic sustainability
- Initial design of a cap and trade system Impacts Leakage
  - Cap trajectory
  - Scope of Coverage & Point of Regulation
  - Allowance Allocation Methods
  - Offset availability

Cap Trajectory & Target – Dow Positions

- Align to USCAP positions in Blueprint for Legislative Action.
  - 14% - 17% reduction of 2005 baseline by 2020
  - 80% reduction of 2005 baseline by 2050
- Policy must include capability to review and course-correct for changes in
  - Emerging Climate Science
  - Projected Progress towards achieving the targets and associated costs
  - Unintended policy outcomes
- Complimentary Policies may be most environmentally effective and economically sustainable method for some sectors
  - Building Energy Efficiency Requirements
  - Appliance Energy Efficiency Requirements

Scope of Coverage & Point of Emission – Dow Positions

- Align to USCAP positions in Blueprint for Legislative Action.
- Economy wide program
- Feedstock Exemption
- Point of regulation reduces administrative burden
  - Refinery Gate
  - Refined product importers
  - Fuel Providers
  - Natural Gas Distributors

Allowance Allocation Methods – Dow Positions

- Align to USCAP recommendations
- Hybrid of Free Allocation and Auction
  - Energy Intensive Trade-Exposed receive adequate free allowances
  - Allowance value distribution should avoid undue economic gain or loss while contributing incentives for low carbon investment
  - Allocations to Utilities/NG distributors on behalf of low income consumers
  - Auction revenues for R&D of new low carbon technologies
  - Auction revenues for avoided deforestation

Offset Availability – Dow Positions

- Align to USCAP recommendations
- Early and plentiful supply of international and domestic offsets to contain cost & allowance price increase
  - 2.0 billion – 3.0 billion metric tons availability
  - EPA administers a program that ensures offsets are environmentally additional, verifiable, permanent, measurable and enforceable
  - EPA should establish a transparent process for evaluating and approving domestic and international offsets
  - Establish Allowance Reserve Pool early in the program to make allowances available in the event of extreme price spikes and/or volatility

Straight Tax – Dow Position

- No guaranteed environmental benefit if people “just pay” and don’t change behaviors
- Government Revenue may not be spent on R&D of new low carbon technologies

Summary

- Well designed cap and trade policy provides
  - Environmental benefit in an economically sustainable manner
  - Regulatory certainty
  - Transition assistance for energy-intensive and trade exposed industry
  - Complimentary policies that require chemistry solutions