Global Carbon Pricing:
A Better Climate Commitment

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Roadmap to Global Cooperation

1. Avoid cap-or-tax fight
2. Avoid problems of Copenhagen
3. Replace cap & trade game with pricing + green fund

4. How price commitment works
5. Cheap & effective
6. Oil security, China and climate

(1) Not the Cap-or-Tax Fight

INTERNATIONAL AGREEMENT

Pricing Is Not Taxing

- **Under Global Carbon Pricing**
  - Every country could use cap and trade
  - With **no carbon taxes anywhere** !!
  - Or countries can use any mix of cap, tax & feebate they want.

International commitment ≠ *National policy*

What Do We Want in a Commitment?

1. Make cooperation easy
2. An easy path to stronger commitments

(2)

COPENHAGEN

APPENDIX I: QUANTIFIED ECONOMY-WIDE EMISSIONS TARGETS FOR 2020

DEVELOPED COUNTRY	*Quantified economy-wide emissions targets for 2020*	
	Emissions reduction in 2020	Base year

APPENDIX II: NATIONALLY APPROPRIATE MITIGATION ACTIONS OF DEVELOPING COUNTRY PARTIES

DEVELOPING COUNTRY	*Actions*

The Copenhagen Accord: China

"China will endeavor to lower its carbon dioxide emissions per unit of GDP by 40-45% by 2020 compared to the 2005 level."

- DOE (May 2009) estimated 45%
- Previous 15 years China cut intensity 44.4%
- So, 45% is Business as Usual

http://www.global-energy.org/lib/2009/09-08

Copenhagen Accord: India

- India committed to doing half as well as business as usual
- Other developing countries commit to nothing and want subsidies

Developed Countries

- All commit to more
- Europe and Japan commit to much more

- Everyone agrees there was a *polarization* of rich and poor countries, starting at Kyoto and now much worse

Why?

(3) A Theory of Cooperation

THE CAP-AND-TRADE GAME

Roadmap to Games

- **Public Goods** game → Cooperation problems
  - If abate 50% is best
  - U.S. self-interest → abate 10%
  - Canadian self → abate 1%
- So, change the game — to **cap & trade** ?
  - U.S. self-interest → target 17% (buy 9% abroad)
  - Canadian self → target –6% (sell **C** permits)
- So, change the game to **Pricing** + **Green Fund**
  - Self-interest of all → P^T that's just right (strong)

First: The Public-Goods Game

- Country ***i*** picks an Abatement level, A_i
- To maximize its net benefit =

  benefit from all abatement

  minus ***its own abatement cost***

- Even big countries choose an A_i that is about five times too low

The Cap-and-Trade Game

1. Countries pick a Target level, T_i
2. Maximize the same net benefit ***minus***

the cost of carbon permits for $T_i - A_i$

- How does their target, T_i, compare with their abatement, A_i, in public-goods game?

Polarization Theorem

- Identical countries ➔ $T_i = A_i$
  - Targets = Abatement in public-goods game

- Different size countries ➔ Polarization
  - $T_i > A_i$ for big countries
  - $T_i < A_i$ for small countries

- Also, there is less total abatement

Rich-Poor Polarization

- Cap and trade causes Rich-Poor polarization

Intuition

1. Trade ➔ all face the same price of carbon
2. High abaters think it's cheap (and do more)
3. Low abaters think it's expensive (and do less)

- We can do better with

  Global Carbon Pricing & **Green Fund**

An Example World

- Suppose $30/ton carbon price is optimal
- ***e*** = emissions/capita
- avg(***e***) = world average
- low-***e*** → ***e*** is less than average
- Low-***e*** countries (India) see abatement costs and green funds amplified by avg(***e***)/***e***

The Green-Fund Treaty

1. Countries vote (name a P_i) for global price
2. P^T = the ***lowest*** price named
3. Countries pay ***G*** × (above average emissions)
   Countries receive ***G*** × (below avg emissions)
4. ***G*** = 0.036 × P^T

   (***G*** = \$1.10/ton if P^T = \$30/ton)

So what P^T will countries vote for?

Three Country Example

Country	e	Voted P	P^*	Benefit	Cost	G.F.
	Ton/cap.	$/ton	$/ton	$/capita/year		
U.S.	18	$26	$26	$28	–$12	–$4
China	5	$30	$26	$31	–$14	$0
India	1.1	$26	$26	$6	–$2	$4

- $26 is very close to optimal ($30)
- Poorest countries gain even without climate benefits !

Our Proposal Adds:

- Green Fund rewards low-e countries for achieving P^T
- Carbon-revenue trading to allow flexibility
- ***G*** decided politically

(4) For a Better Commitment

FLEXIBLE GLOBAL CARBON PRICING

The Problems: Perverse Incentives

1. Caps are risky and unfair
2. Poor countries paid not to commit
   (with CDM projects)
3. There is no enforcement
4. Polarizing incentives
5. 100 unique commitments

A Cap Is Risky

- US wants China to cap itself below its trend line
- In 2000, its trend line pointed to 3.5B tons in 2010
- It's BAU turned out to be above 7.0B tons
- Commitment to this cap would have meant buying 3.5B permits on the world market for ~ $100B
- Committing to a price would mean collecting and ***keeping*** $100B in carbon revenue

Caps Appear Unfair

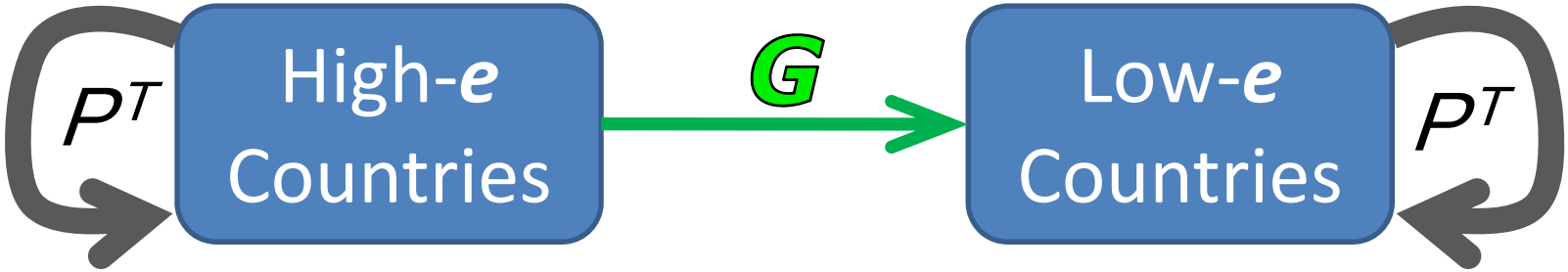
- If India accepted a trend line cap, it would be capped at under 1.5 tons/person
- That is less than the US emitted in 1880
- Why should India be capped so low just because others have emitted so much?

Pricing Overview

Two global parameters

- Global carbon price target = P^T ~ $30/ton
- Global Green-Fund price = G ~ $2/ton

  (Clean Development Incentive, CDI)



e **= the country's emissions / person**

Rule #1: National Policy Flexibility

- Every country could ***use cap and trade***,
- But carbon taxes or a mix are fine

Rule #2: Carbon Price Flexibility

- **What if you don't meet the global price target?**

What if you exceed it?

- Buy/Sell **carbon-revenue credits**
- from another country, through a central "market"

Target revenue: $R^* = Emissions \times P^T$

The country must pay $Z \times (R^* - R)$, where $Z \approx 10\%$

#3: Hitting the Carbon Price Target

- Higher Z → Higher global carbon revenues
- Global Average Price =

  (total revenues) / (total emissions)
- Adjust Z annually

  to make Global Average Price = P^T

  (the price target)

#4: Green Fund Payments (example)

- World average emissions, avg(***e***) ≈ 5 tons/capita/year
- Consider a country with ***e*** = 10 tons/capita/yr
- Assume ***G*** = $2/ton
- The country pays (***e*** − avg(***e***)) x ***G***

(10 − 5) x $2 = $10/capita/yr

- A country emitting 1 ton/cap/yr would receive

−(1 − 5) x $2 = $8/capita/yr

#5: The Green-Fund Incentive

- It replaces the CDM
- It ***rewards*** cooperation
- If a country's carbon price, ***P***, is less than P^T its GF payment is scaled back by $\boldsymbol{P} / P^T$
- It also rewards information and research programs that are missed by carbon pricing

What Counts as Carbon Pricing?

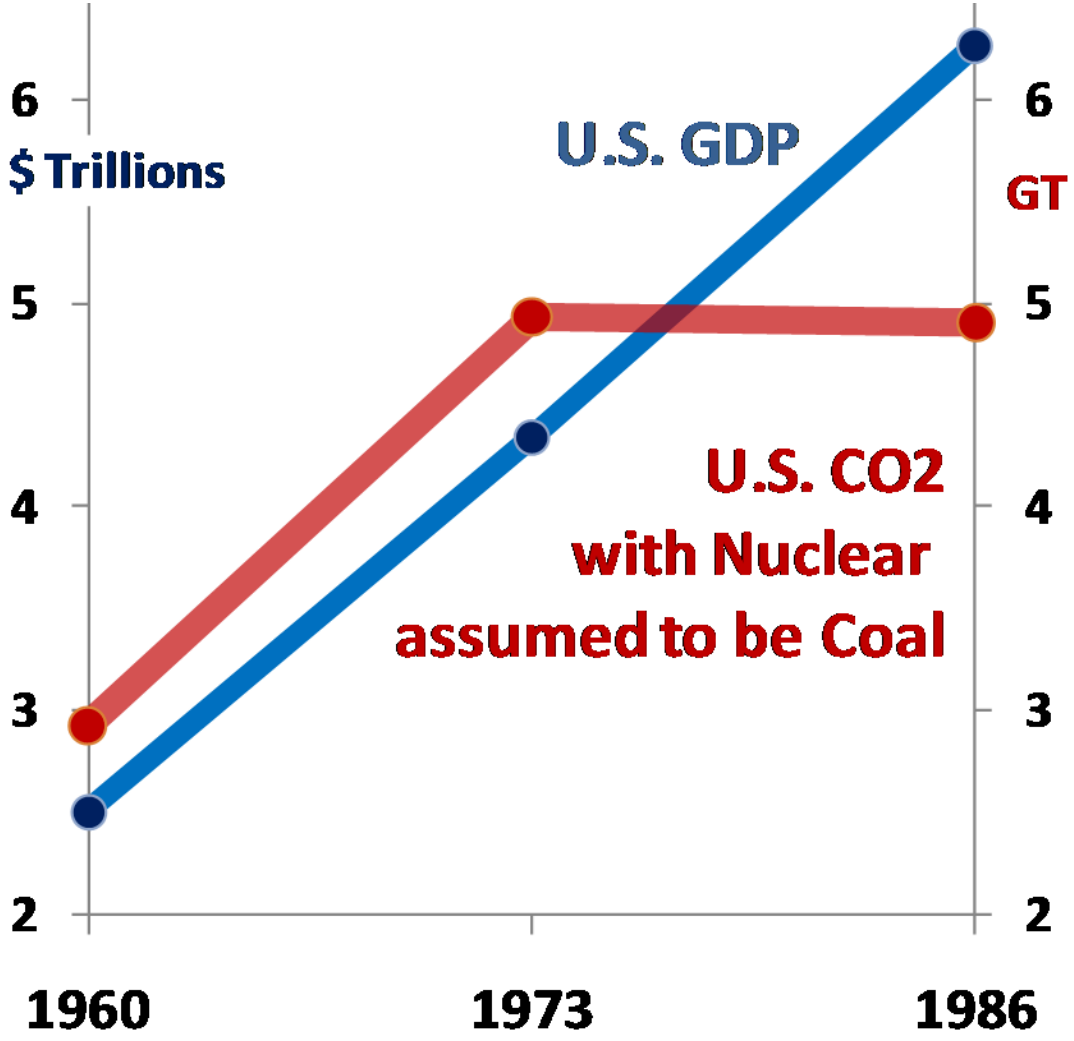
1. Carbon ***permits used*** under ***cap and trade***
2. Any ***tax on fossil fuels***
3. ***Feebates***. E.g. $1/ton of lifetime auto emissions

- But not subsidies or command and control policies

(5) Why Price Carbon?

CHEAP AND EFFECTIVE

OPEC: The Best and Worst Climate Policy Ever



U.S. EPA: Carbon Pricing Is Cheap

Abatement Cost = ½ × Price × Abatement

- The ½ is because sensible abatements cost between $0 and the price of carbon
- For several reasons this is likely too high

Example: P^T = \$30/t, G = \$2/t

	Starting Emissions per Capita	Abatement Costs	Green Fund Cost	Total Cost
	(tons/year)	(cents / person / day)		
India	**1**	**0.8 ¢**	**– 1.7 ¢**	**– 0.9 ¢**
Average Country	**5**	**4.1 ¢**	**0.0 ¢**	**4.1 ¢**
United States	**20**	**16.4 ¢**	**6.6 ¢**	**23.0 ¢**

Assumes **emissions reduced by 20%** from values shown.
China is close to average.

(7) The U.S. and China

OIL SECURITY AND CLIMATE

The Oil-Climate Alignment

- Using less oil reduces:
  - GHG emissions
  - World price of oil
- Half of **IEA's** purpose:
- Half of **Kyoto's** purpose:

To reduce oil use

How Strong Is the Effect?

- MIT on caps: oil price down 34 – 47% in 2050
- IEA on a tight-oil market:

  A 1% cut in use → a 9% cut in price
- Six models, including DOE, found ***at least***:

  A 1% cut in use → a 1.5% cut in price

What's It Worth to Save a Barrel?

- Cut oil use by 1 barrel when price = $100
- That saves $100
- And reduces the cost of all other barrels

  Enough to save $150
- Is this a free lunch?
- No, it's OPEC's lunch

We Need an Oil Consumers' Cartel

"The immediate objective [of the **IEA**] is … the ***consumers' counter-cartel***."

—New York Times, 1974

"the Tokyo [G7] agreement amounts to a ***consumers' cartel***."

—New York Times, 1979

It Could Pay for Climate Policy

20%	Decrease in oil demand by cartel
67%	Of world oil use covered

	China
$49 B/year	Imported-oil savings
$33 B/year	Climate-policy cost

	U.S.
$41 B/year	Imported-oil savings
$25 B/year	Climate-policy cost

Conclusion

1. Carbon Pricing is ***designed*** for cooperation
2. It does not cap India and China
3. One price target, not 100 caps
4. No offset payments to ***not*** cooperate
5. Green Fund rewards (1) setting a high target, and (2) meeting that target

Conclusion

6. It’s easier to comply with
   (Anyone can tax gasoline)

7. It’s easier to enforce
   (Checkups at end of every year)

8. Oil savings brings immediate benefits
   (Not distant and uncertain benefits)