

Cap and Trade Economics and Incentives

(with slides marked **New** to answer questions raised on June 26)

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New

Road Map

1. Carbon pricing (cap or tax) is cheap
2. A carbon cap and a carbon tax are twins
 - A cap is a variable tax.
 - Wisconsin faces a carbon tax, not a carbon constraint.
3. Permit banking reduces carbon price fluctuations
 - Along with offsets, banking means much less carbon reduction in later years.
4. A cap is better and stronger than RES.
5. Free allowances for utilities will interfere with the cap.

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1. Carbon Pricing Is Cheap

With a Cap or a Tax

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Why Carbon Pricing Is Cheap

- Pricing = a **carbon tax** OR a **carbon cap**.
- Cheap = Most bang / buck*
- Pricing causes **All and Only** the cheapest measures
 - Price upstream to include everyone.
- With a \$17 price, people find **ALL and ONLY** the ways to save carbon for less than \$17/tonne.
- Carbon saving costs from \$0 – \$17. The average is less than half of \$17.
(Because the more you reduce, the fewer the opportunities.)

* Some market failures allow for cheaper carbon savings, e.g. fuel efficiency standards.

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EPA's Cost Estimate

(of Carbon Pricing)

- EPA's ADAGE model of Waxman bill in 2015:
\$17/ton causes → 408 mmt reduction (6% of GHGs).
- Abatement Cost = $\frac{1}{2} \times (\text{carbon price}) \times (\text{carbon reduction})$
- Abatement Cost = $\frac{1}{2} \times \$17 \times 408 \text{ mmt}$
- Abatement Cost = \$3.5 Billion = **3¢ / person / day**

- EPA's IGEM model: \$13/ton → 761 mmt (11%)
- Abatement Cost = \$4.9 Billion = 4.4¢ / person / day

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But Where Do Revenues Go?

- Spend revenues on green subsidies and you increase the cost by 14 to 25 times. (Revenues = \$66 – \$85 B)
(Energy-efficiency subsidies cost less.)
- Return it on an equal-per-person basis:
 - And 3¢/person/day is right answer.
 - 60% of the population gets more back than they pay
 - Carbon pricing is no longer regressive
 - This is called “cap and dividend” OR an “untax”*
 - The untax is the basis of all standard economic models.

* Not a standard term.

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Questions:

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Is a carbon cap or tax very expensive?

- Carbon pricing (a cap or a tax) is the cheapest way to fix the mistakes caused when the market ignores the problem of climate change.

Why is it so cheap?

- Because the market organizes everyone to do what's cheap and only what's cheap—with no subsidies for pet projects.

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2. Cap and Tax Are Twins

Not Identical Twins

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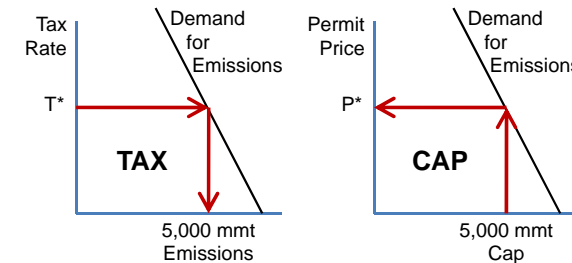
A Carbon Tax with “Quantity Certainty”

- **Cap emissions at 5,000 mmt by using a Tax:**
- Guess a tax rate, T. Say, \$40/ton on January 1.
- It looks too low on February 1. So, set $T = \$60$.
- Then, \$70, oops, \$40, \$35, \$50, \$40, \$20 ...
- On Dec. 1, we’re coming in a bit above 5,000. With little time left, set $T = \$250$, and ...
- We come in at 4,983 mmt. Great, we did it !!
- **We could enforce a cap with a tax.**

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Cap=Tax (ignoring price fluctuations)

- If tax T^* causes 5,000 mmt of emissions, then
- A cap = 5,000 mmt will cause permit price = T^* .



Permit = Allowance or Offset

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So, Cap & Trade Is Just a ...

- **Variable carbon tax**
- The permit market price is the tax rate
- The tax rate fluctuates to enforce the cap
- Compare: Cap vs. Tax
- If average permit price = tax rate
- **A tax will reduce emissions more,**
- Because investment is less risky (cheaper).

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Questions:

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Does Wisconsin face a carbon constraint?

- No, only a fluctuating carbon tax.

What should Wisconsin do?

- Do projects that save carbon more cheaply than buying carbon permits (paying the carbon tax).
- Don’t save carbon if it costs more, because someone else can and will do it cheaper if you don’t.
(That’s what’s great about carbon pricing!)

Does a volatile tax cause problems?

- Allowance price fluctuations will delay some green investments, but that’s not a fatal flaw.

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3. The Banking of Permits

With Banking, Annual “Caps” Are Not Caps

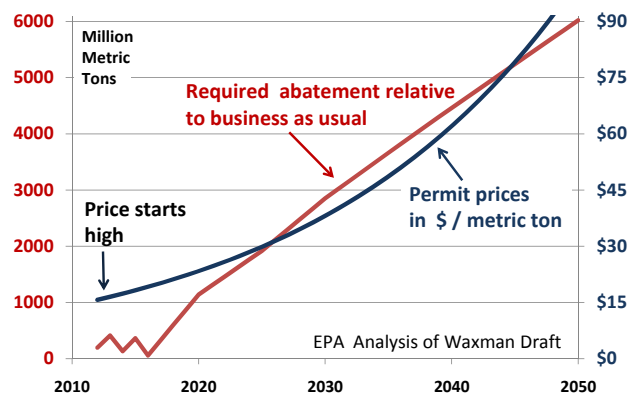
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Why Have Banking?

- A 1-year cap causes trouble in December.
 - The permit price soars or tanks
 - depending on the overshoot or undershoot of the cap
- Solution:
 1. Allow permits to be saved for the future
 2. Start the cap slowly
 - Companies will bank permits early on.
 - Banked permits keep the price from soaring in December.
 - The future value of permits keeps the price from tanking.

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Banking: The Long Run Sets Prices



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So, Cap & Trade with Banking is ...

- A variable carbon tax that can be pre-paid at any time at the current tax rate.
- The tax rate fluctuates to enforce the 39-year total cap—not the annual cap.
- Fluctuations in the annual cap matter very little—only the total 39-year cap matters for permit prices.
- That’s the theory.

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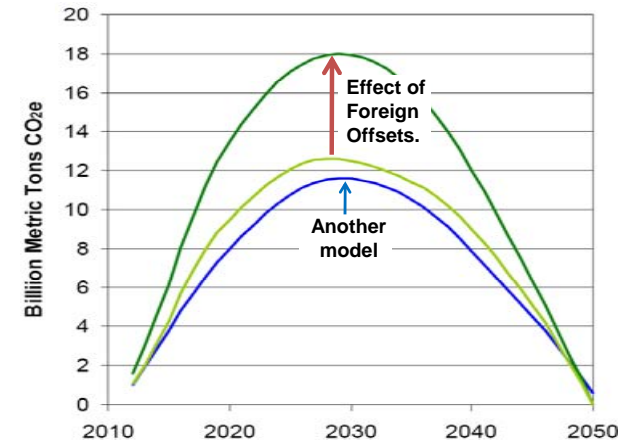
Banking in Practice

- Permit price is not affected by short-term cap
 - Only true if people believe in the cap's future.
 - Not so true in Europe. Why ??
- In 2012, EPA's IGEM predicts companies will buy

112	Domestic Offsets
1000	Foreign Offsets
+ 4770	Federal Allowances
= 5882	Total allowed tons of emission permits
- 4303	Actual tons of emission
= 1579	Banked allowances
	(all in mmt)

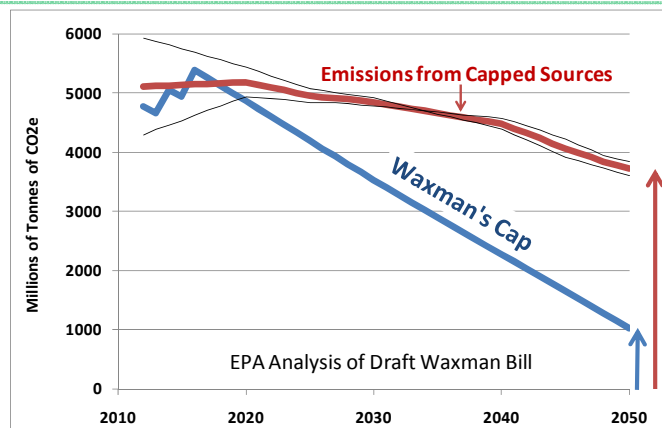
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EPA: Cumulative Banked Permits



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Effect of Offsets and Banking



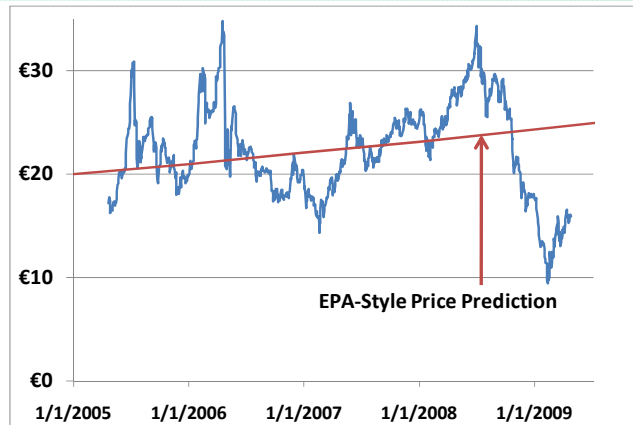
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In the Actual Bill: More Offsets

- EPA analyzed the draft bill.
- The draft said: Up to 1,000 foreign permits can be bought every year.
- That was amended to allow up to 1,500 tons of foreign offsets every year.
- There will likely be more banking.

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EU Carbon Prices with Banking



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Questions:

Is permit banking a bad thing?

- It is needed to reduce carbon price fluctuations.
- But, even with banking, EU carbon prices are still three times more volatile than the S&P 500.

Will Wisconsin need deep carbon cuts by 2030?

- Due to offsets, national carbon reductions will be far less than advertised after 2020.
- Wisconsin should not try to mimic the nation—just follow the carbon price signal. That's the point of carbon pricing (caps or taxes).

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4. Caps versus Standards

Carbon Constant, Prices Down, Cost Up

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Preview: Are Caps Better than You Think?

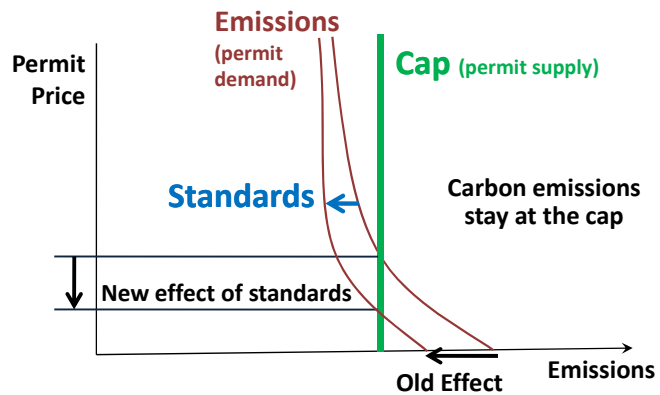
- Before caps, we needed Renewable Electricity Standards (RES).
- But RES-type programs do not work well with a cap. With a cap, RES does not save carbon and it raises costs.

Does this mean a cap is bad?

- No. This happens because (1) the cap really does control emissions, and (2) the cap is more cost effective than almost anything else—including RES.
- A cap is better than RES. So let the cap work.

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Standards Reduce Permit Prices



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Standards under a Cap

- The following **will not save carbon**:
 - Renewable electricity standards
 - Fuel efficiency standards
 - Appliance standards
 - Buying a hybrid car
 - Riding your bike to work
- But all of these **will lower the permit price so others can emit more (burn more coal, buy Hummers).**
- Burning more coal will no longer hurt the climate.
- There will be no more carbon footprints.

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Germany Did the Experiment

Spiegel Online notes, “Experts have known about this situation for some time, but it still isn’t widely known to the public.”

“Dear Daniel, sorry, but **the renewable energy law won’t do anything for the climate** anyway.” That’s from an internal email obtained by Spiegel from Germany’s Green Party.*

“Despite Europe’s boom in solar and wind energy, CO₂ emissions haven’t been reduced by even a single gram. ... **German wind turbines... simply allow Eastern European countries to pollute more.**”

*www.spiegel.de/international/business/0,1518,606763,00.html

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How the Cap Works in Germany

- **Wind generators make clean electricity.**
- German coal plants burn less coal.
- Coal-plant owners sell all their extra permits.
- Some permits go to Poland, Slovakia, etc.
- **Polish and Slovakian plants burn more coal.**

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Renewable Electricity Standards

- The **\$20/ton** cap makes coal more expensive.
- It's like a subsidy for wind of ~ \$15/ton carbon saved.
- On top of a production credit subsidy of ~ \$15/ton.
- Wind needing less than ~ \$30/ton will be built.

- Extra RES wind costs more than \$30/ton saved.
- But the cap saves carbon for only **\$20/ton**.
- ➔ If RES builds wind generators,
RES will raise costs and save no carbon.

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Questions:

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Does the cap work?

- Yes, the cap will control carbon emissions.
- And, carbon trading prevents states and individuals from reducing capped national emissions.

Does RES work?

- Not under a cap. (1) It can't save carbon.
- (2) Since the cheap- and medium-cost renewables will be built because of carbon pricing and production subsidies, additional investment will be expensive and raise the total cost of meeting the cap.

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5. Free Allowances for Utilities

Carbon Constant, Prices Down, Cost Up

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Distributing Free-Permit Benefits

The Waxman bill's guidelines:

1. "exclusively for the benefit of retail rate payers."
2. "Distributed ... based on electricity deliveries to each class"
3. Distributed "equitably among individual rate payers."
4. Not "solely on the quantity of electricity delivered."
5. **To the maximum extent practicable, provide such rebates with regard to the fixed portion of rate payers' bills.**

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Rates and Refunds: How Much?

- Utility gets 100 mmt of free allowances,
- But needs 110 mmt.

- Average auction price in 2012 is \$15 – applies to 100.
- Buy 10 mmt in secondary market for \$10.

- \$160 M goes into the rate base.
- \$150 M gets refunded to ratepayers.

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Fixed-Portion Refund vs. Fairness

- Base refund on a customer charge and:
 - A Family of 1 and a family of 10 get the same refund.
 - A 25 kW and a 500 kW business get the same refund.
 - Having a big family or a big business does not mean you are less careful with energy use.

- The big ones will object: Not “equitable.”
- For business, I predict the refund will be proportional to a demand charge.

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Rates vs. Refunds

- Refunds proportional to demand charges will significantly reduce the demand charges.
- Utilities do not like to spoil demand incentives.
- So they will restructure their rates to increase demand charges (and decrease energy charges).
- Net charges will look about the same as before.
- The bill will say the refund is on the demand charge.

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End Result of Refunds

- Electricity prices will be too low.
- Business will conserve too little energy.
- Energy intensive goods will be too cheap.
- Because of the cap, some other carbon savings must take place.
- Allowances will cost more.
- Total cost of cap and trade increases.
- No more carbon is saved.

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Questions:

What's the point of free-allowance refunds?

- (1) To give more money to coal states, but (2) keep the same strong incentive to conserve electricity.

Will the refunds succeed?

- Yes on #1.
- Probably "Yes" on #2 for residential customers, because refunds can be based on the customer charge.
- Probably "No" on #2 for business customers. It will appear that the demand charge is reduced, but really the energy charge will be reduced—destroying the conservation signal.

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Questions:

Does the failed price signal matter?

- Yes. In the long run, the price signal works to conserve a lot of electricity and carbon.
- Taking away one option for carbon savings will make carbon savings more expensive nationally.

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The Big Question:

How Can Wisconsin Go Beyond the Cap?

- Save GHG emissions in a way not covered by the cap.
 - This really will reduce total emissions.
- Save carbon at a net cost less than the price of allowances in a way the private sector would not.
 - This will save the nation money, and
 - It will save Wisconsin money.

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The End

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Bonus Question:

Why Do Emissions Stay Up to the Cap?

- Simple explanation:
 - Many businesses want to emit even more than the cap.
 - They will buy up any spare allowances and use them.
- Detailed explanation for a simpler economy:
 - Suppose the only fossil fuel is gasoline.
 - Refineries need one permit per gallon of gasoline they sell.
 - All permits are auctioned.
 - There are too few, so there is a shortage of gasoline.

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A Cap on Gasoline, continued ...

- The shortage causes the price of gas to go up, which pleases the refineries, and they try to buy more permits so they can sell more high-priced gasoline.
- This drives up the prices of permits to, say, \$1.50.
- Everything is economically in balance.

- But then ...
- California thinks the cap is not strong enough and decides to help the cap save more carbon.

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California Decides to Help the Cap

- California requires cars to get 40 miles per gallon.
- After three years, gas mileage is up in California.
- California refineries buy fewer permits at auction.
- Reduced demand for permits drives the price of permits down (say to \$1.00) until refineries in other states buy all of the permits California does not need.
- Other-state refineries have more permits to sell gasoline, so they lower the price of gasoline by \$0.50, and they sell enough gas to use all their additional permits.
- The market is super good at making sure the price of gas and permits goes down enough to use all the permits.

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The (almost) Impossible Exception

- Unless the permit price goes all the way down to zero, the market will make sure all the permits get used and that means emissions will equal the cap.
- No one believes the permit price can go to zero.
- All permits will be used.
- California will save no carbon.
- It will just make it cheaper for other states to burn gas—and they will.

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Loopholes ???

Are there loopholes in this argument?

(This is bit more advanced.)

- Under Waxman-Markey, when a state like California saves more carbon, and lowers the price of permits, it will not change the number of allowances purchased, and EPA estimates it will not change foreign offset purchases. But fewer domestic offsets may be purchased at the lower price.
- So here's an example of how that might work ...

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The Fewer-Offsets Effect

- Say we start with 4,000 mmt of permits, 500 mmt of domestic offsets and 4,500 mmt of emissions.
- Then California "helps the cap" and 100 mmt fewer domestic offsets are purchased at the lower price.
- Now we have 4,000 mmt of permits, 400 mmt of domestic offsets and 4,400 mmt of emissions.
- So emission were cut by 100 mmt (good), and offsets were cut by 100 mmt (bad).
- If offsets are real, there is no net change in carbon.

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The Fewer-Offsets Effect (part 2)

- If one ton of domestic offsets capture only one half ton of carbon (if they are half bogus), then ...
- California has saved 100 tons of emissions and lost only 50 tons of, say, agricultural carbon capture.
- So there is a net gain of 50 tons.
- The same effect could likely be achieved at lower national cost by allowing 100 fewer tons of domestic offsets, and letting the cap do it's cost-effective work with no help from California.

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