

Social Cost of Carbon

Robert Mendelsohn

ICCC-12

The Heartland Institute

What is the social cost of carbon?

- It is the price of a ton of CO₂
 - It is not the price of fossil fuel
- It is calculated as the present value of the stream of global consequences (good and bad) from adding one more ton of carbon dioxide into the atmosphere
 - Present value means that future effects are discounted back to today
 - Calculated given a future path of emissions (future concentrations)
 - Stream lasts as long as the ton stays in the atmosphere (centuries)

SCC is sum of net damage across countries

- One third of global damage to OECD (developed) countries
- Two thirds of damage in emerging and undeveloped countries
- US share of global damage is about 2%
 - Mostly coastal damage from storms

Affected Sectors (from most vulnerable to least)

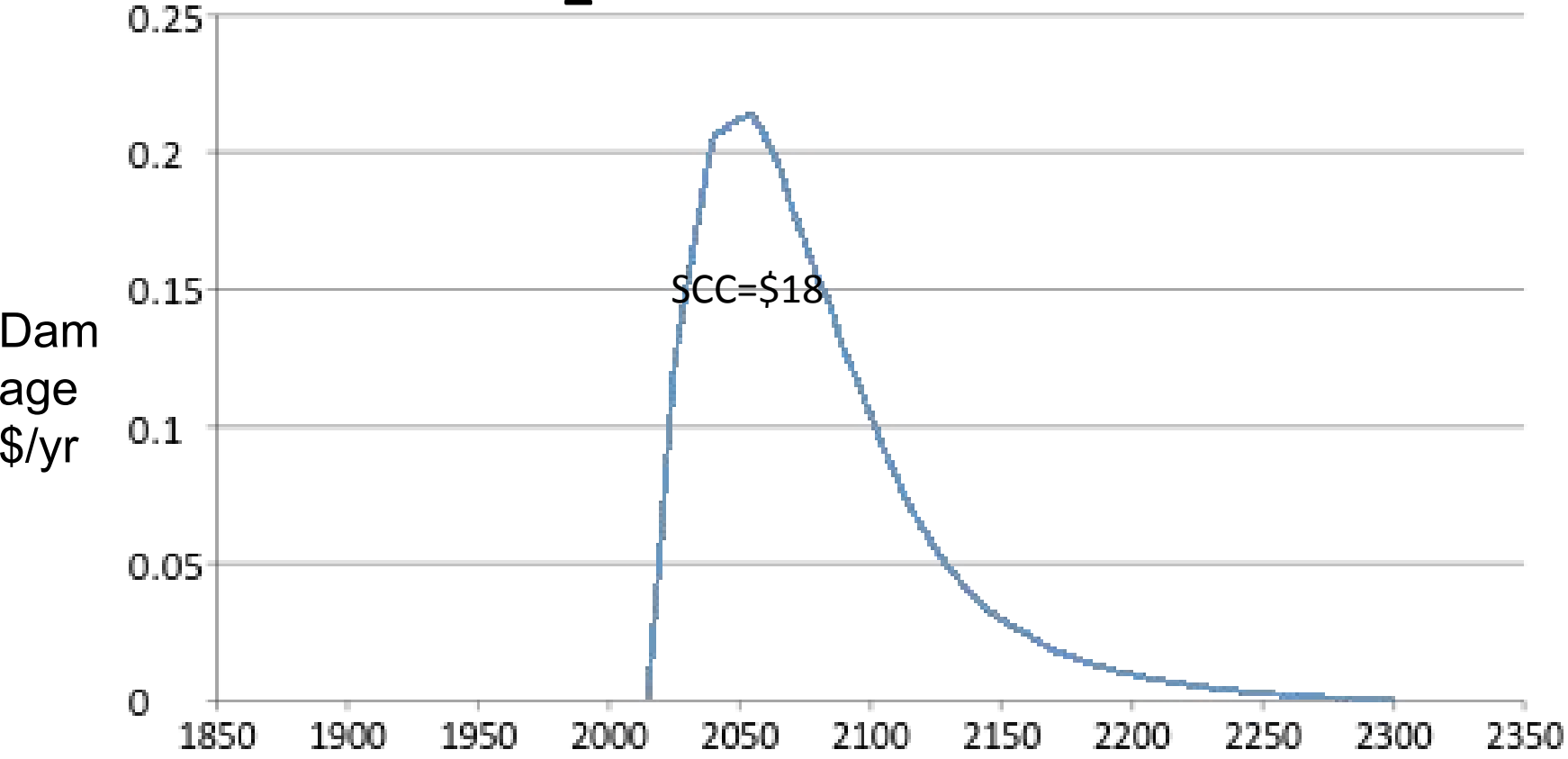
- Market

- Coastal (Sea level rise, storm intensity increasing, catastrophe)
- Agriculture (warm semi-arid vulnerable)
- Energy (cooling damage, heating benefit)
- Water (irrigation, cooling, transport)
- Timber (likely benefit)

- Nonmarket

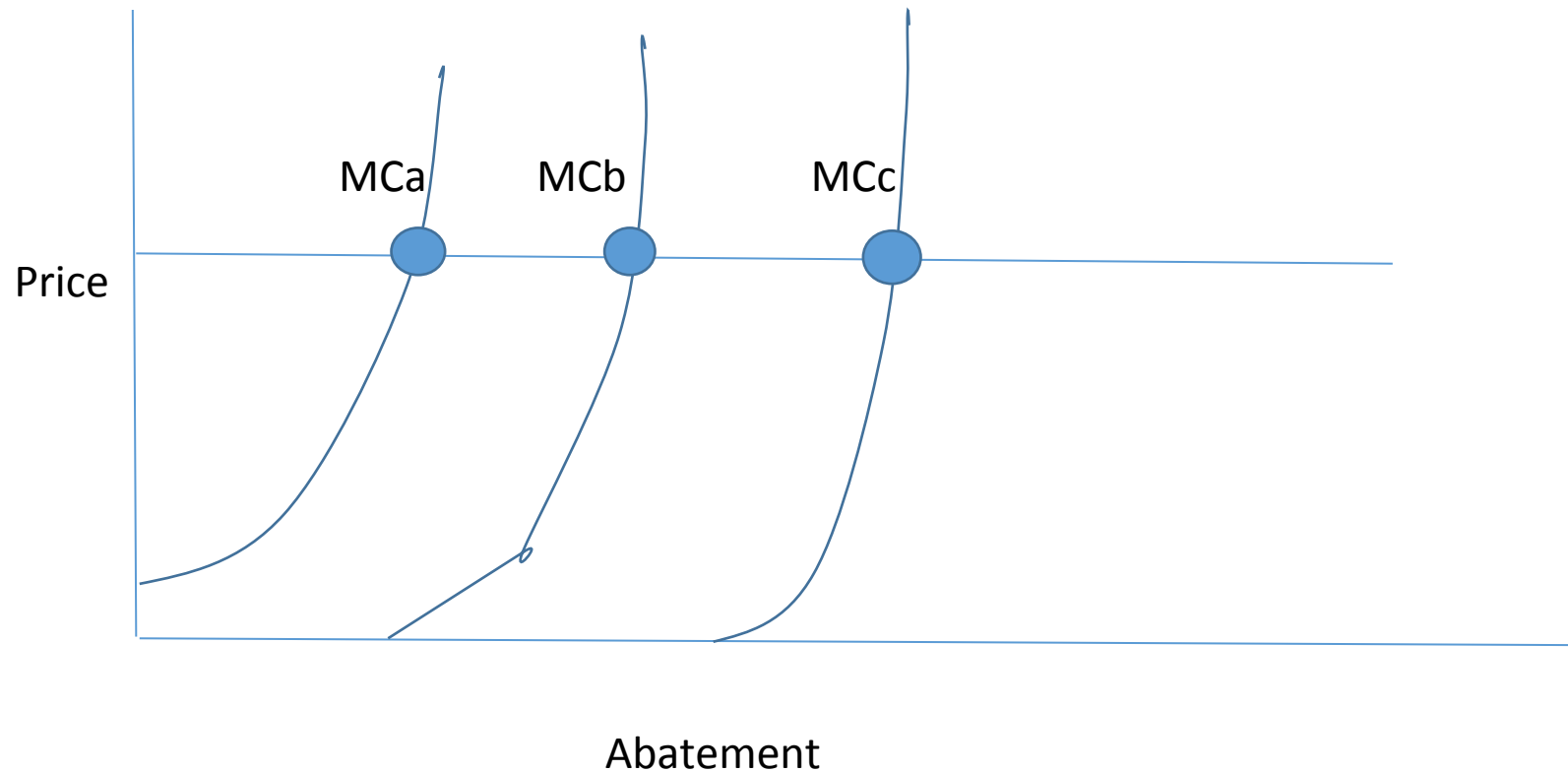
- Health (Disease, heat stress, ozone)
- Ecosystem (Shifting biomes, endangered species)

Stream of damage according to DICE from a ton of CO₂ emitted in 2015



What is the value of having an SCC?

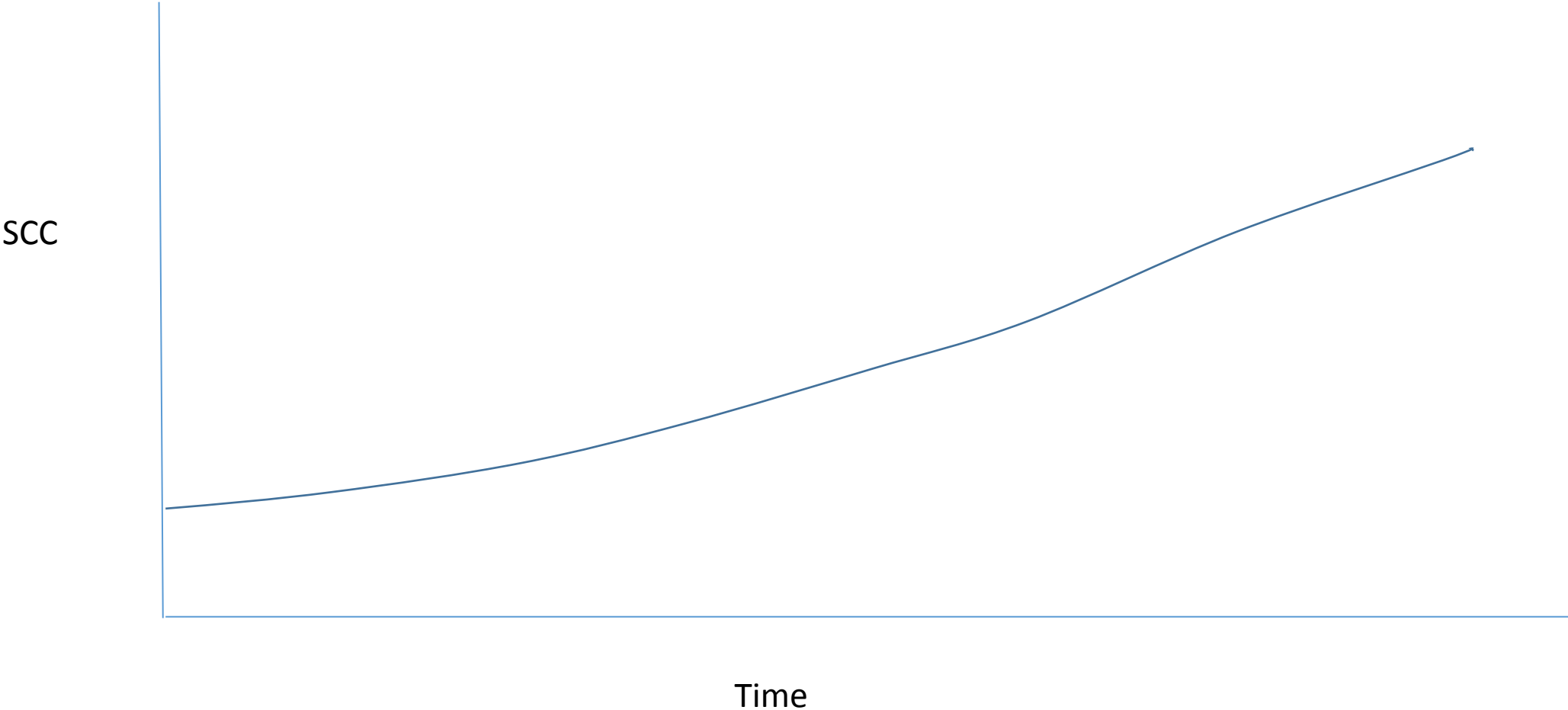
- One price for entire world- only regulation needed
- Equate marginal cost of abatement to SCC (price)
 - Encourage cost effective abatement across world



How would fossil fuel industry react to SCC?

- At $SCC < \$100$, energy price slightly higher, use more low carbon fossil fuel, use less high carbon fossil fuel
- At $SCC > \$100$, use carbon capture and storage for coal and eventually all carbon fuels
- At $SCC > \$200$ - $\$300$ leave remaining fossil fuels in the ground, move to zero carbon economy

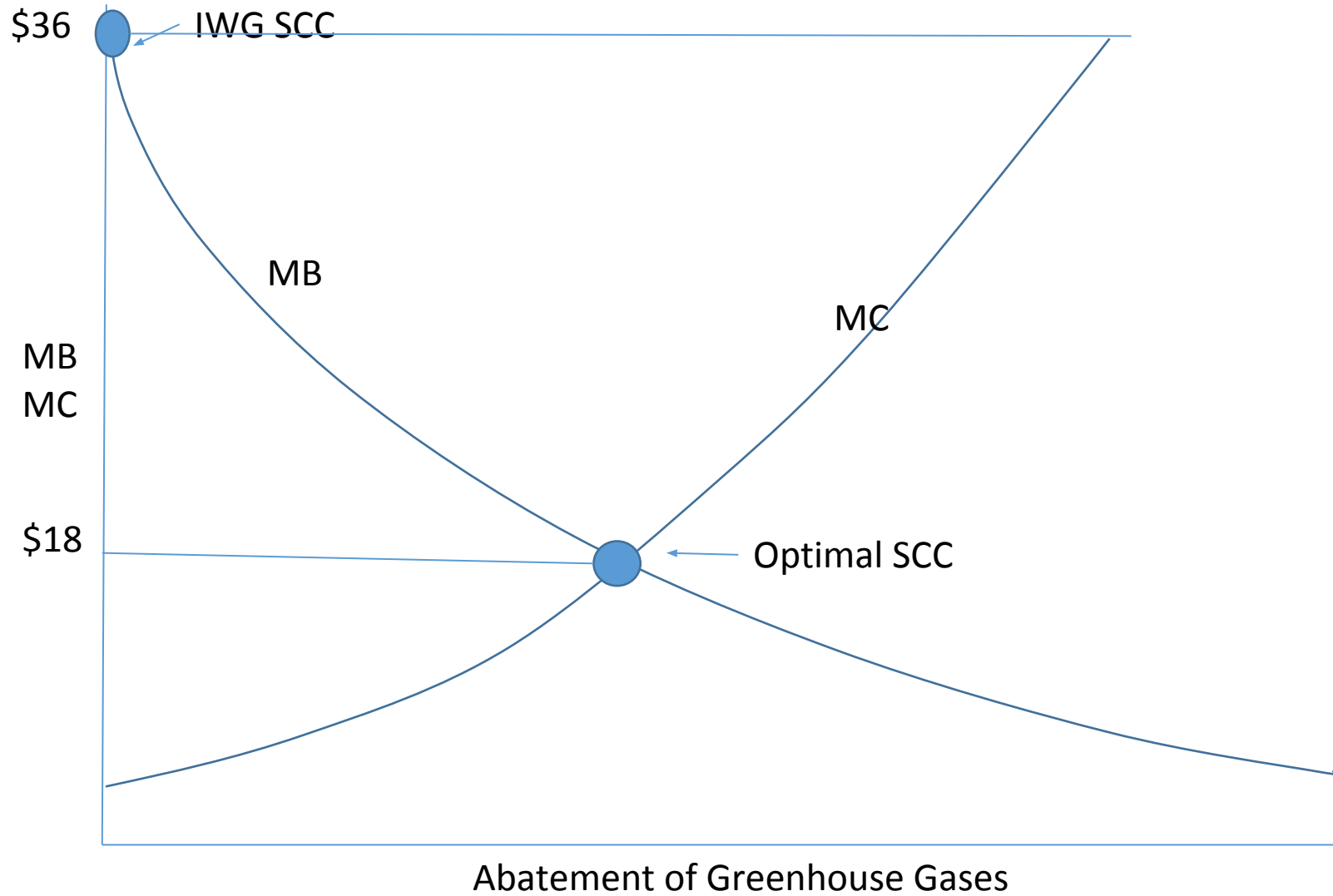
SCC increases over time as concentrations (temperatures) rise



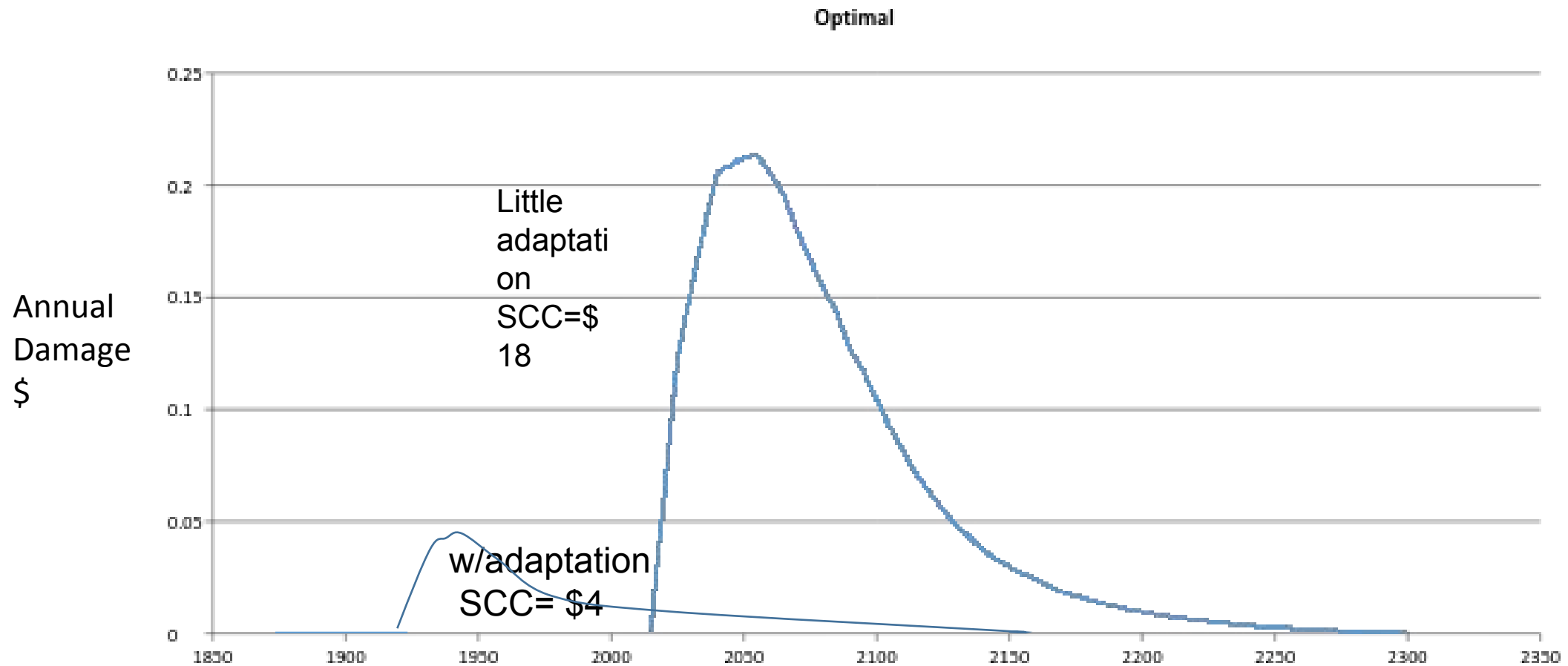
US Government estimated the SCC for 2015

- Interagency Working Group on Social Cost of Carbon estimated (with a 3% discount rate) a value of \$21 in 2010, \$24 in 2013, and \$36 in 2016
 - Assumed there would **never** be any mitigation or adaptation in the next 300 years
 - Assumed no adaptation
- Optimal SCC equates $MC=SCC$ (MD), then $SCC=\$18$
- Damage likely with adaptation, then $SCC=\$4$

Where to measure the SCC?



Stream of Damage Caused by a Ton of Emission in 2015 in DICE(2013)



What do other countries use as price (SCC) of a ton of CO₂?

High		Low	
Norway	\$51	Japan	\$8
Sweden	\$33	China	\$3-\$13
Italy	\$27	Argentina	\$4
Germany	\$26	Canada	\$4
United Kingdom	\$16	US REGI	\$2-\$3
US California	\$10-\$15	Brazil	\$2