

CCL's Intro & Series Overview

00:04 Good evening and welcome to everyone. We are so glad to have you here uh for the opening session of Citizens Climate 00:14 Lobby's carbon pricing education series in partnership with [resources for the future](#). I am your host tonight, Mindy 00:22 Aller. I am CCL's congressional liaison program manager and we have put a lot of planning into this series. So, I am 00:30 really excited that it is finally here and that we get to be starting tonight. Um, I also want to extend a special 00:37 welcome to all of our guests that are joining our CCL volunteers for this series and a big thank you to all of the 00:44 groups that have been sharing this event. I know that's what has really helped it uh reach far and wide. Um, and 00:51 in addition to our partner RF, I know that Republican shared a special invitation for this series with their 00:58 network. So I want to give a particular welcome to our friends from Republican Eian that are joining us tonight. 01:05 Tonight's topic is the current economic consensus on carbon pricing. And this session will cover the basics of carbon 01:12 pricing to give you a good grounding for those that are new to carbon pricing. And for those already familiar with 01:18 carbon pricing, you'll see how researchers who've made substantial contributions to the field in the 01:24 academic literature are talking about it. So to give you a sense of where we're 01:30 going tonight, um here's our brief agenda. So first I'll give a quick overview of our carbon pricing series 01:37 and where this came from. Then I will turn it over to Mark Halfstead with RF for his presentation and then we'll 01:44 leave plenty of time for audience questions. So you can get ready and start putting your questions in the Q&A. 01:51 Look for the Q&A button at the bottom of your screen. you might have to click on the more option in order to see it. Um, 01:58 we have a team that will be curating those questions to combine common topics uh and to make sure we stick to things 02:05 that are covered for this session tonight because we will have a lot more on carbon pricing coming up in future 02:11 sessions of the series. So, as questions come up for you during the presentation, go ahead and enter them uh right away 02:18 into the Q&A. So this is the first of six sessions in our carbon pricing series following the 02:27 research to lead the politics. For all of our guests who might not be familiar with uh [citizens climate lobby](#), CCL is a 02:35 nonprofit nonpartisan grassroots organization that empowers everyday people to bridge divides and build 02:42 political will for effective climate solutions in Congress. We are committed to advancing federal policies that 02:49 reduce emissions, remove climate pollution, and protect people. And we're delighted to be partnering for this 02:56 series with [resources for the future](#), also known as RFF. RFF is a leading think tank that has advised policy 03:03 makers for decades, on actions that lead to a healthy environment and a thriving economy. 03:10 We're putting a link in the chat now um so that you can register for future sessions in this series if you haven't 03:16 already because we would love to have you join us for any and all of those sessions. 03:21 As a little more background, CCL has been working on carbon pricing for over a decade and in that time the pricing 03:28 and the political landscape has shifted and more recently there have been significant international advancements. 03:36 We put this series together to dive deeper into those changes and the lessons we can learn from international 03:42 carbon pricing and domestic changes to strengthen our understanding and to build our most effective climate 03:48 advocacy for carbon pricing. Now, we recognize that folks on this call probably have different levels of 03:54 understanding of carbon pricing. Tonight's session is really meant to be a foundation for the remainder of the 04:01 series. So, it will help those of you

that are new to carbon pricing learn the basics. And for those of you that are [04:08](#) more familiar, it's always great to take a step back and make sure we have a solid understanding of carbon pricing [04:14](#) that is framed with up-to-date data and realworld current developments. As our series progresses, we'll get into more [04:22](#) of the complexities of carbon pricing. So, if you follow the link for registering, you'll see the titles for [04:28](#) our upcoming sessions. All of these sessions, including tonight, will be recorded and are going to be available [04:35](#) after each session is aired. I encourage you to approach this and every session with a sense of curiosity and an open [04:43](#) mind um ready to absorb all the data that RF is going to provide to us. We'll also be holding a feedback session [04:52](#) hosted by our carbon pricing action team after each of the sessions of the series to gather feedback from all of you. [05:00](#) We want to pull out all the learning and gather the full perspectives of what you as our volunteers and as our guests are [05:08](#) hearing on these calls and how it should inform our work going forward. So I'll say more about this at the end of the [05:14](#) call so that you know how you can participate in the feedback session. All of our regular CCL volunteers are [05:23](#) familiar with the fact that we love to track participation in the action tracker. This helps us track our [05:29](#) progress and measure our impact effectively. So, first make sure you're logged into CCL. And then all you need [05:34](#) to do is follow this link. Uh, and we'll repeat this at the end too in case you missed it at the beginning. [05:42](#) So, with that, I want to introduce uh our speaker for tonight. Mark Heststead is a fellow at [Resources for the Future](#), [05:50](#) RFF, and the director of RF's carbon pricing initiative. He joined RFF in 2013 [05:58](#) uh from [Stanford University](#) where he received his PhD in 2011 and then spent two years as a post-doal fellow at the [06:06 Stanford Institute for Economic Policy Research](#). His research primarily focuses on the evaluation and design of climate [06:14](#) and energy policies with Stanford professor and RFF University fellow Lawrence H. Goulder. He wrote, [06:21](#) "Confronting the climate challenge, US policy options to evaluate policy options to reduce carbon dioxide [06:29](#) emissions. His preeminent research on economywide and sector specific climate and energy policy analyzes the [06:36](#) distributional and employment impacts of carbon pricing and the energy transition more broadly. Uh it also looks at the [06:44](#) design of tax adjustment mechanisms to reduce the emissions uncertainty of carbon tax policies and state level [06:51](#) climate policies such as cap and invest in multiple states. So you can see why we are so delighted to have Mark here to [06:59](#) share his work with us. So please join me in welcoming Mark Hstead and I'll turn it over to you Mark. [07:05](#) Well, thank you. Thank you for having me here. Um, so yes, as um, Mindy

RFF's Introduction & Agenda

[07:12](#) mentioned, this is the first in a six-part series. I will mention uh, what some of our other topics will be. Um, [07:18](#) for those of you who are really familiar with carbon pricing, um, this won't, uh, be anything new. Uh, but for people who [07:25](#) are new to it, um, I hope you can, uh, learn something new tonight. Um, so first, let me just talk about [07:32](#) Resource for the Future. We're an independent nonprofit institution in [Washington](#) DC. Um, importantly, RF does [07:38](#) not take institutional positions on any type of public policy matter. So, we do not advocate for policies. We view our [07:45](#) role as providing uh trustworthy information to policy makers so they can make better policy um um better policy. [07:57](#) Um so, what are some of the RF topics of study beyond just carbon pricing and carbon markets? Um we also have um uh [08:05](#) topical areas on climate risk and resilience, electric power, land use forestry and agriculture, [08:11](#) transportation, communities in the energy transition and international, federal and state

climate policy. Um you 08:17 can please go to rf.org uh to learn more about our work in any of these areas. So uh I am the director of RF's carbon 08:26 pricing initiative. Um just a few tools that I wanted to um let you all know about ahead of or right away. Um we have 08:33 a carbon pricing calculator. It is a little bit dated um but it is a build your own carbon pricing policy uh tool 08:41 and it allows you to compare um I shouldn't say current proposals but past proposals um particularly um the the 08:50 number of bills that were introduced in the 116th and 117th Congress. Um, we also have a carbon pricing bill tracker. 08:57 Um, we haven't had bills introduced in the past few years. Um, so, uh, these are, uh, pretty much a all the carbon 09:04 pricing bills that have been introduced in the past, uh, 5 years, five or six years. Um, and then we have a carbon 09:12 pricing explainer series. Uh, we are working on um, doing a refresher of that. Um, but it has great background 09:17 and in-depth information on the effects of carbon pricing across sectors, household household income groups, human 09:23 health, employment, and more. We also have a nice video. It's about 5 minutes. Uh, I um would love for everyone to 09:30 watch. Uh, we also have numerous inerson virtual webinars on future of carbon pricing and I'm pretty sure all of those 09:36 are still on our website. Um, so about myself real quick, I was born and raised in Minnesota, but I'm 09:43 currently a resident of New Mexico. Um uh my education is from Northwestern and Stanford. I joined RF in 2013 and I'm 09:50 the director of RF's carbon pricing initiative. Um so a little bit more about our carbon 09:57 pricing education series. It's going be the first Thursdays um with the exception of December. Um and so tonight 10:04 is is kind of intro to carbon pricing. Um the the in October we're going to talk about affordability and the 10:10 distributional impacts of carbon pricing. Um in November we're going to talk about current policy trends uh 10:16 carbon border adjustment mechanisms uh carbon intensity and sectoral policies. Um in January we're going to talk 10:24 directly about intensity standards is as potentially a uh alternative to uh what's you know traditional carbon 10:31 pricing. Uh in February we're going to talk about US state and local developments and we're going to take a 10:36 global look uh next March. So I hope you guys can join us for the rest of these um uh webinars in the education series. 10:47 So just the outline for the next uh 40 minutes or so. Um first I'm just going to I just want to talk about just some 10:55 you know basic facts on climate change and US greenhouse gases. Um and then I'm going to talk through just kind of what 11:00 I what I consider the theory and evidence for climate change policy options including carbon pricing. We're 11:06 going to talk about carbon pricing design options and then I'm going to talk about how we use economic models to 11:10 evaluate climate policy options and specifically using a carbon tax as an example and we'll look at some of the 11:16 outcomes that we're able to uh model. So um a lot of people think because the US doesn't have a national or federal uh 11:26 carbon price that carbon price is impossible and a carbon price cannot be achieved. There's nowhere that's not 11:33 close to the truth. um carbon pricing rally today. We have carbon pricing all around the world. Um this is from the 11:40 world carbon pricing dashboard. It's worldcarbon pricing um.com. Uh I will say that RF has helped fund 11:48 the uh building of this data set. And uh this is a nice really nice tool that allows you to look at carbon pricing 11:56 across the world, across sectors, across time. And so here I'm just I did a screenshot. Um the United States, we 12:04 have an average of a \$2 uh US uh dollar per ton of CO2 carbon tax. That's taking into account the Reggie uh power sector 12:14 in the Northeast and the California and Washington capp trade programs. Um so it's not zero, but it's very low. 12:20 But you'll see that other countries around the world are doing similar things. So the idea that just because we 12:25 don't have a federal um carbon price I I think does not mean that um we should be ignoring carbon pricing because it's a 12:33 policy that's being pursued uh around

the world. Okay. So now let's get into some um 12:40 through our outline. Um so just setting the stage here. I

Climate Change and Greenhouse Gas Facts

12:45 don't think this is going to be news to anyone here. Um historical CO2 concentrations are alltime highs. um 12:52 from 1700 to the present, we've seen a huge increase in uh the concentration of CO2 at um the uh monitoring station at 13:01 Monolani in Hawaii. And we are now at about 426 um ppm uh at an all-time high um and has 13:11 been growing rapidly since uh 1950. Uh we can pull even further back. People can say that this is um 13:21 that we have fluxes in our CO2 concentrations. We've not seen this type of flux in the last 800,000 years. We've 13:28 had fluxes up and down. We've never had concentrations above 300 parts per million before uh about 1950. and we 13:38 have skyrocketed over the last uh 60 or 70 years to where we are today at 425 uh ppm. Uh we cannot say that this is part 13:48 of a uh natural cycle. Um and so we do need to do something about these concentrations. 13:56 And so I I've I've shown this this this this um table and or this this slide in a number of presentations. You know, I 14:04 don't think I I think I'm preaching to the choir here. Why do we care about CO2 and greenhouse gas emissions? I think we 14:09 all know that higher CO2 concentrations and other GSGs contribute to climate change and that can include warmer 14:16 temperatures, rising sea levels, shrinking ice caps, warmer oceans, stronger storms, and potentially animal 14:22 and plant extinction. Um, we also know that carbon emissions contribute to ocean acidification. Uh, and that has 14:28 increased rapidly since uh pre-industrial revolution levels. Uh, it also lowers the pH levels and it has 14:34 severe effects on marine life. This also has economic effects um as it can significantly deplete our fisheries. Um, 14:42 so I'm not going to really talk about the science of climate change anymore. Um, I we take that as um as kind of a 14:49 given fact and now we're going to try to see what we can do about it through um uh carbon carbon policies. 14:58 Um, and so just looking at our global carbon dioxide emissions real quick. Um, I I found this uh nice graph today 15:06 online. Um, our our CO2 emissions have grown sixfold since 1950. Uh, most of that growth uh has been from China and 15:15 China is now the largest current emitter of carbon dioxide. However, the US has contributed the most cumulative 15:20 emissions uh since 1950. Um, so this is this is an issue that we um could have been dealing with in maybe in the 1990s 15:29 um and or even in the 2000s and and we have not and the problem has has gotten worse and worse and it is a global 15:36 problem. Um, and so let's just uh just remember that in the back of our heads. Um, so now I'm going to get into US uh 15:43 greenhouse gases and then we're primarily going to focus on US policy for the rest of uh the program tonight. 15:49 Um so uh US greenhouse gas emissions and sinks by gas. Um greenhouse gases are primarily a carbon 16:00 dioxide problem. Carbon dioxide is by far the largest uh source of greenhouse gases um that we have that we emit. 16:10 Um if we look by sectors, I have two graphs here that we'll look at. So um this is going to be greenhouse gas 16:15 emissions by economic sector. um where this kind of cumulative we're going to kind of add up. Um so transportation and 16:23 electric power industry as you can see have been by far our biggest uh contributors. Um industry is also a a 16:30 contributor with about half of the emissions attributed industry being from CO2 and half being from other types of 16:36 of gases. Um here uh we can look at this separately. Um so here we're not looking at cumulative view but we're looking at 16:43 sector on the y- axis and um as you can see electric uh power kind of peaked around 2005 and has uh 16:54 declined substantially. Uh transportation has been pretty

flat. It's down a little bit. Uh we never 17:00 quite recovered our emissions uh postco. I will say that this is our inventory as of 2022. Uh this inventory was published 17:09 in 2024. Uh the Trump administration is no longer publishing this data. Um so that is going to be a potential issue 17:19 going forward as we're trying to understand uh where we are uh with our greenhouse gas emissions. There are some 17:25 groups such as at the University of Maryland who are working to reproduce uh our emissions inventory. Um and so I 17:32 think we're might have to be able to rely on those private sector um organizations 17:36 uh for for the time being um to help us understand uh where our uh greenhouse gas emissions actually are. Um if we 17:45 look at a number, if we just look at numbers at a table, um as I mentioned that, uh CO2 is by far the largest 17:52 source of uh emissions that we have um in our inventory. And of those, most of those are from fossil fuel combustion. 18:01 So again, uh dealing with uh greenhouse gases is primarily an issue with dealing with emissions from 18:10 fossil fuel combustion. Um, and that's what carbon pricing is really good at, uh, addressing. 18:17 And so, just kind of like a summary, um, 79.7% of gross GHSG emissions are actually from carbon dioxide. Of those 18:26 carbon diox carbon dioxide emissions, 93% in 2022 were from fossil fuel combustion. Uh, electricity, electricity 18:34 and transportation are by far the two largest sources of fossil fuel combustion in the US. Uh, electricity 18:39 emissions have fallen quite a bit since 2005, 36%. The 57% drop in coal generation uh or emissions from coal 18:46 generation. Uh, but transport transportation emissions have been relatively flat. They've fallen by less 18:51 than 6% uh since 2005. Okay. So, now that we kind of know where

Climate Change Policy Options

18:57 our emissions are and what our sources are, what can we do about uh trying to uh reduce those emissions through 19:04 economic policy? Um, so, so what are some of our options for reducing emissions? Well, we have 19:11 emissions pricing. And so I'm using I use the term carbon pricing generally to refer to capp trade or a carbon tax. I 19:18 think these are basically synonymous. They have a few differences and I will go into those differences. Uh, but when 19:23 I say pricing, I'm generally referring to either a capp trade or a carbon tax. If I'm specifically referring to one, I 19:29 will use it its explicit name. We also have regulation for reducing emissions. Um and we have a number of these 19:37 policies either at the state or federal level uh for a number of years. So you can think of performance standards uh 19:42 cleaner renewable energy standards uh fuel efficiency standards or energy efficiency standards. Now it is true 19:48 that the Trump administration has tried to roll back many of these federal level standards and has attacked states for 19:54 the policies that they have. Um and so we are seeing a roll back of the regulations that we have have had. And 20:01 then you could also think about direct government investment. This is very similar to what the IRA tried to do. 20:07 It's true that the IRA did taxes um or did some subsidies um uh to try to promote uh renewable energy and EVs. Um 20:17 but a lot of the money that came out of the IRA was also direct government investment investing directly in um say 20:24 hydrogen hubs or direct air capture hubs um and and things like that. So those are, you know, policy options 20:33 that that we have on the table for reducing emissions and these have been uh discussed over a number of years at 20:38 the federal level and pursued um at the either the federal or state level if a number of these policies have. So uh 20:46 pricing is a marketbased mechanism to reduce pollution. Why do economists like it? It reduces emissions through three 20:53 primary channels. First, it has the intensive margin decrease emissions per unit of demand. Um so this is just 21:00 basically we

are going to make it uh less emissions intensive to produce a unit of electricity uh or we are going 21:09 to increase the fuel efficiency of our vehicles uh such that we are emitting less per uh vehicle mile traveled. 21:18 Um but it also emissions of pricing reduces emissions through reducing demand uh by right increasing the 21:25 relative price of goods that use uh that are carbon intensive. People might want to use less of them. So vehicles that 21:34 are very uh fuel inefficient uh might see their VMT uh be reduced and people might switch between their less uh fuel 21:43 intensive vehicle and their more or and their more efficient vehicle. And so that switching is going to reduce um 21:50 demand for uh um for emissions. Uh we could also see that for electricity um by increas slightly increasing the price 22:00 of electricity. People might uh invest more in energy efficiency. Uh they might just use less electricity. Um but it 22:07 also does do some uh has some incentives for capture whether that's direct or indirect. I'm not going to talk very 22:14 much about CCS or or any kind of carbon dioxide removal. They're currently very very expensive and untested at scale for 22:21 CO2. But it does give you a um channel, you know, it does give an incentive to invest in these technologies because it 22:29 is a way to reduce emissions without necessarily um reducing the energy use that goes into um uh the things that we 22:38 uh demand. So the economic case for carbon pricing is a tool for climate policy. Uh why do 22:46 economists like carbon pricing? Uh first uh it's flexible. It allows the market to determine when, where, and how 22:54 emissions are reduced. And it allows emissions to be deduced through all those three channels that I just talked 22:59 about. It also equalizes incentives, not necessarily reductions across sectors. So you're going to get more reductions 23:06 in the lowcost sectors, less reductions in the high cost sectors. This is the way that we're going to achieve uh a 23:14 certain level of emissions reductions at the lowest cost through uh a carbon price. 23:21 It also encourages innovation across the energy sector uh including negative emissions technologies. And then 23:27 finally, uh the economic case for carbon pricing is that it creates revenues, which is much different than any of the 23:33 regulations or direct government investment where it actually loses money for the government. Um and so here this 23:39 is a \$1 trillion bill from the Simpsons. Uh because it is a potentially very large source of revenues uh that could 23:47 be used in a number of number of ways. Um so why do we think these are efficient emissions reductions? Well, 23:54 you can think of a marginal abatement cost curve and a marginal damages curve. This is going to like take might take 24:00 you back to like your econ 101 class in either high school or or college. Um, so we basically have our our baitment cost 24:06 curve and our our marginal damagements curve. And what carbon pricing is going to do is it's going to find where those 24:13 two those two intersect and it's going to give us a price level and a level of emissions. 24:19 But in practice, uh, what we don't know is we don't actually know what that marginal damage curve looks like. Um, 24:26 one of the issues is that one ton of CO2 emitted today interacts with our climate system for over 100 years. Um, and then 24:33 how do we measure damages? Um, how do we discount future damages? So, right now, the social cost of carbon is our best 24:40 attempt to measure those marginal damages. uh for a long time uh based on some estimates in the Obama 24:46 administration that social cost of carbon was around \$56. Uh some of my colleagues who've done more recent 24:52 estimates think that that uh estimate should be more around \$170 or even greater. But there's still a lot of 24:57 uncertainty in what that number is. And really what they are doing is they're producing distributions of of of cost 25:04 and reporting the average cost than they are actually trying to actually uh predict a per precise number. So it's 25:11 really hard to figure out what the damages actually actually are. Also the marginal abatement curves. The cost of 25:17 abatement is uncertain and we don't know there's unknown future technologies and we also don't know the technologies we 25:24 do know

that are out there. We don't know how their costs are going to change over time. So we don't actually know how 25:29 expensive it will be to reduce emissions uh over time. And so we really don't know what that curve looks like. But 25:35 what what does emissions pricing do is um so you can either set the quantity of emissions, the cap and trade, and let 25:42 the market determine the price. So we don't know what the marginal abatement cost is, but if we set our level of 25:47 emissions at EAR, um the market's going to do its trick, and it's going to spit out us a P star. Or we can set the price 25:54 of emissions, the carbon tax, we can set the P star, and we don't know what the marginal abatement cost is, but then the 25:59 economy is going to work and it's going to spit us out a level of emissions. So we don't have to know the marginal 26:04 abatement cost to make uh carbon pricing work. So I mentioned I could talk a little bit 26:12 about cap and trade versus carbon tax. Uh cap and trade uh some of the pros it's a mostly guaranteed level of 26:18 emissions reductions. We have set the cap. That's what the cap is. That's what the emissions are going to be as long as 26:24 the policy is working. However I say it's mostly guaranteed. If the price gets high, policy makers can always come 26:31 and dismantle the program. They can always say, "Never mind, this is getting too expensive. We don't want to do 26:36 this." Um, another another thing that's good about uh a cap trade is it there's emissions allowances. So any anyone who 26:44 is covered by the policy has to have an allowance that they were required to hold and then submit to the government 26:50 at the end of a year. And the way those allowances are can be distributed a number of way. They could be given free 26:56 to industry. they could be auctioned. It could be a hybrid approach and there's going to be different economic effects 27:00 of those. Um but there are different ways you can uh allocate those those allowances. 27:06 Um the cons um the cost of abatement is uncertain and the price will fluctuate over time. Um we have seen the price of 27:14 the EU uh emissions trading system which has been in place since uh the mid200s. We've seen that price fluctuate all over 27:21 the place. uh in particularly that price has skyrocketed uh during times of uh global e uh geopolitical crisis 27:28 including the war in Ukraine and the war in Iran. Um also setting the cap has proven 27:34 difficult in practice. You have some policy makers who are trying to predict the future. They're trying to um quote 27:41 unquote um thread the needle because they don't want the policy to be too expensive but they also want it to be 27:47 binding and effective and reduce emissions. And so a lot of times they set the cap maybe a little too high or 27:53 they set the cap and then three years later there's a global economic recession in which case um the the cap 28:00 they set was for a world with much larger economic growth which much less economic growth. The policy is 28:06 much less stringent and much less binding and uh and that was the case in the European Union when they set their 28:13 policy in 2005 and we had the global economic recession in 2008. There's also lots of institutional detail and what I 28:20 called a pro about emissions allowances being uh distributed in a number of ways that creates a lot of political 28:26 bargaining um which can make the policy really difficult to actually get over the finish line. That's something we saw 28:31 during the wax and market debates um in uh 2009 and 2010. Now carbon tax um the price is certain. 28:41 We know what the price is going to be because the price is set by the policy maker. Uh and there's going to be no 28:46 issues of investment under uncertainty. We know what the price is going to be. We know what the price is going to be 28:50 next year. We know what the price is going to be in 10 years. It's also relatively easy to implement. There's 28:55 much less decision-m that needs to be made to implement a carbon tax. Um uh but some of the the the cons of a 29:03 carbon tax is first um and this is something you'll hear from uh mostly green groups is that the level of 29:09 emissions reductions are uncertain. If we set the price, we don't necessarily know what the emissions

reductions are 29:14 going to be. Um and it could be we could set the price too low and our emissions are much higher than we would want them 29:19 to be. And also the price doesn't respond to new information. So if we have global economic shocks, um the 29:27 price will still be the price. Um and that could be a good thing or a bad thing. 29:34 So um I actually forgot to add a slide here. I was going to do a yes, but uh about 29:40 emissions pricing. Uh yes, but uh that all sounds great, but uh but what about unilaterally implementing a carbon 29:48 price? Um so I apologize for not getting that slide in here. Um but yes but so if you implement a uh carbon price 29:55 unilaterally there are some issues economically that could be created and primary so environmentally the issue is 30:02 leakage is that the emissions reductions that you are achieving in your jurisdiction are going to be offset by 30:08 increased emissions in another jurisdiction. So the globally you're not going to get as much emissions 30:14 reductions as you thought and carbon dioxide is a global pollutant. it's global stock pollutant and and so um any 30:22 emissions reductions that you achieve in your uh jurisdiction through your policy that are offset in other jurisdictions 30:29 uh that's leakage um and that's going to be uh mitigating the benefits of of the policy globally and and so I think the 30:37 other yes but is that the benefits are global but the costs are local and also not just environmental emissions leakage 30:45 there's also economic leakage where factories could potentially move uh to jurisdictions um could offshore uh 30:53 to places that don't have the same type of policy. Now, those are being those can be addressed in a cap and trade 30:59 program. Those can be addressed through what's called output based allocation. Um this is where you give allowances to 31:06 industrial firms that are environment uh that are trade exposed. um and you have some formula that you do this with and 31:14 you basically say that the the amount of allowances you get are based on um how much you produce and so this gives you 31:20 an incentive to keep producing in your jurisdiction. This is what California does with their cap and trade program. Um 31:26 also state of Washington also does output based allocation uh for a carbon price. Um I think instead of output 31:33 based allocation you could combine a carbon or sorry a carbon tax you could combine a carbon tax with a carbon 31:38 border adjustment mechanism. So, the E European Union has a CBAM uh that they've started implementing this year. 31:44 Um, we're going to get in more of that uh in one of their our future uh sessions. So, I won't go into too much 31:50 detail. Uh, but that's a way of trying to put tariffs at the border uh to prevent um unfair competition from uh 32:00 jurisdictions that don't have a similar carbon price. So very quickly, alternatives to 32:08 emissions pricing, their standards. Uh what do what do standards get right or wrong? Well, standards still uh give you 32:16 the incentive to on the intensive margin to decrease emissions per unit of demand. However, these standards do not 32:23 do not exercise the extensive margin. They do not um promote conservation. Um and so uh these standards can act as a 32:31 subsidy to output. And so the more you produce uh is actually better. And and so these standards um are not going to 32:40 have the same price impact uh which some would argue is good, but you could also argue that it's bad because it's not 32:46 giving the price signal to consumers that they could consume less of the dirty good. 32:52 Uh regulations, they often require specific technology adoption regardless of costs. So, it's going to have an 32:58 intense a margin effect, but it's going to ignore the differences in abatement costs across firms. And so, what you're 33:03 going to do is you're going to you're going to make some firms make really costly reductions uh at the expense of 33:09 being not being able to make lower cost reductions elsewhere in the economy. So, what are some examples of emissions 33:18 pricing? Uh we have cap and trade. The first one was the US acid rain program which went into effect after the 33:25 clean air act amendments of 1990. Um we had the EU emissions trading scheme. I

mentioned the regional greenhouse gas 33:31 initiative which covers power plant um emissions in the northeast and we have California and Washington's cabin trade 33:37 program. I apologize to our friends from Washington on the call here that I forgot to add you there. Um carbon tax 33:44 we have seen carbon taxes in British Columbia and Canada. Yes, but has been repealed uh as of uh 2025 or 2026. Uh 33:53 Sweden and Norway had a carbon tax for a long time. Australia had a carbon tax for a while was repealed and I think 33:59 they're doing more of a a cabin trade approach now. Um we have number of renewable portfolio standards across the 34:06 country um at the state level. Uh interestingly enough, the first one was in the state of Wisconsin. Uh but I 34:12 think maybe one of the most important ones is in the state of Texas. uh regulations 34:17 uh cafe standards have been along for a very long time. Um the clean air act um when the clean air act was effective we 34:25 had federal standards for new modified and reconstructed sources although that has been uh attempted to be taken away 34:31 and also the cafe standards are attempted to be taken away uh by the Trump administration. 34:38 So how do we evaluate the impacts of these different climate policies? Um so one we can try to evaluate existing 34:44 policies and so the questions we have to ask are how can we identify the causal impact of the policy we have to ask 34:50 whether it's counterfactual and we have to we have to know what the comparison group is and then when we want to uh 34:56 evaluate future policies we have to ask can we apply what we learned from one policy to another and a lot of times the 35:03 answer is no so let's just look at the British Columbia carbon tax real quick uh it 35:10 covered almost all burning ing of fossil fuels in uh British Columbia uh which is 70% of all their GHG emissions actually 35:18 uh that's a typo. Uh it was implemented in July of 2008 starting at \$10 a ton uh but large portions of it were repealed 35:26 in 2025. So any consumerf facing part of the tax was repealed in 2025. There is still a tax on industrial users. Um, 35:36 interestingly enough, the government was legally required to return all tax revenue to the taxpayers through tax 35:40 reductions. Uh, there was a uh part of the bill that said if the treasurer did not return all the tax revenue to 35:47 taxpayers, he would lose his job. Um, and this this in even in 2010 2011, this was this was a lot of money uh for the 35:56 province of British Columbia. And they did this through a number of different uh they returned the money through a 36:02 number of different different ways. Um was it effective? Well, in two the policy was implemented in 2008. 36:10 Emissions fell quite substantially uh to 2009. However, we also had a global economic recession at the same time. Um 36:17 so it's hard to causally estimate the impact of uh what happened uh for emissions in British Columbia uh because 36:24 it was time to coincide exactly with this large um economic disruption. Um we could also look at the um greenhouse gas 36:33 emissions per unit of of of gross domestic product uh and and so we do see you know substantial kind of 36:42 decline uh from 2008 to 2014 but you also saw substantial declines prior to that. So again, this these can be hard 36:50 to disentangle the effects of of energy and carbon pricing policies from what's what else is going on in the rest of the 36:58 economy. Um, and so here you can kind of see the decoupling of uh uh economic growth and emissions in British 37:08 Columbia. There's another very similar graph like this for California. Um and so so you know but emissions have kind 37:15 of stayed relatively constant while the economy grew very fast. And so I would argue this is some good evidence that 37:22 the carbon pricing was working is that you have such a huge increase in economic growth post the um the global 37:30 recession while emissions were flat. Um but it is hard to disentangle.

Carbon Price Design Options

37:37 Um so that's why we're going to use economic models to evaluate our policy options. But before that I want to talk 37:42 about some carbon price uh design options. Um what how do you design a carbon price? Um 37:50 uh so price or stringency. So economic theory suggests the price should equal the marginal cost of damages. As always 37:56 I mentioned the social cost of carbon is uncertain and at levels that I don't think we will ever see as politically 38:02 realistic. Um, so that means that policy makers are going to face a trade-off between environmental benefits of higher 38:08 prices and or stringency and the economic costs of higher prices or stringency. And so I have seen uh I've 38:17 seen policy makers present a wide range of uh carbon pricing pass over time. Um some of them started at \$10 and rose at 38:25 \$10 a year uh over time. Uh some of them started say at \$50 and grew at 5% a year. Um, some of them started at like 38:34 \$10, grew by \$1 a year for eight years and then grew by \$10 a year after that. Um, you know, I would call that the 38:42 hockey stick approach where you keep the price really low while current politicians are in place. When those 38:46 politicians move on, then you increase the price uh substantially. Um, so the future politicians are on the hook for 38:52 the higher prices, not the uh current politicians. So that's a policy choice. Um, but I've seen lots of different 38:57 versions. And I don't think economists can really say, you know, if we're not equating, uh, our price to the social 39:04 cost of carbon, economists are going to say, let's do something that's, uh, going to be politically feasible. Um, 39:10 uh, carbon price, um, when you design a carbon price, you have to just choose coverage of the policy. Which sectors 39:15 and gases will be covered? The EUETS covers about 40% of, uh, GSG emissions from, uh, the EU. uh British carbon 39:24 British Columbia's carbon tax did apply to almost all fossil fuel combustion. Uh but again they have repealed that. So 39:30 now it applies to a much much smaller uh um part of its economy. But this is a choice that policy makers 39:40 have. They do not have to choose an economywide policy. Um and we're going to get to that into one of our future 39:45 sessions as well. Um we're also uh you can think about point of regulation. who's actually on the hook for uh 39:53 submitting allowances or paying the tax. So, an upstream uh price is going to cover fossil fuel producers when the 40:00 fossil fuel comes out of the ground. You can call this like consider this like an output tax. Uh a mid-stream price is 40:06 going to cover the first purchaser of fossil fuels regardless if they combust the fuel. So, you can think of this as 40:10 if a refiner buys a barrel of oil, they have to pay for the carbon content of that barrel of oil as a tax. Um, if a 40:17 coal generator buys coal, they have to pay for the carbon content of the coal. We don't care if they burn it or not. 40:22 It's just that they purchased the fuel and we know how much they purchased. We know how much carbon is in it. We're 40:27 going to assume that it eventually will be combusted somewhere and so we are going to charge them for that. Now, a 40:32 downstream price is going to cover those that combust fossil fuels. I don't think anyone thinks this is feasible. This 40:37 would be charging uh households uh at the pump for uh the carbon content of the fuel they're purchasing. Um and and 40:45 that just doesn't seem feasible. Um so most economists like to say that the point of regulation should be the one 40:50 that has the smallest administrative burden. But this is a uh design choice. Economically it doesn't really matter. 40:58 Um the prices are going to go up and down up up the value chain and down the value chain. And at the end of the day 41:03 the prices that uh consumers and producers face are going to be about the same. And then we also have revenue use. 41:09 Uh this is the fun one. What do we get to use with all that big money? So, I know the Citizens Climate Lobby for a 41:15 long time lobbied for the tax and dividend approach. So, we're giving dividends back to every household. 41:20 That's certainly one way to approach the issue. Um the uh Market Choice Act, which was first introduced by uh a 41:28 Republican named Carlos Kubelloo, who is no

longer in Congress, um basically would use the revenues to restore the 41:35 federal highway trust fund while also uh removing the federal gas tax. Um, I've also done a lot of work to show what the 41:41 economic effects were if you use the revenues to reduce personal uh or corporate tax rates or even other types 41:47 of taxes such as payroll taxes. And these are all going to be uh have very similar environmental effects, but 41:53 they're going to have very different economic effects. They're going to have different efficiency effects and they're 41:58 going to have different distributional effects. And so I don't have a lot of time here. I do have a lot of slides 42:02 here, but we're going to share these slides. Um, and so you guys can go

Using Economic Models to Evaluate Climate Policy Options

42:07 through this um, at your leisure. So I'm just going to skip through this really quick. Um, but when we do model based 42:13 climate policy evaluation, I just want to be really clear. There's no such thing as one model would rule them all. 42:17 That's my favorite Lord of the Rings joke. Um, good economists build models to answer specific questions. And the 42:23 types of models that we use have different trade-offs, especially due to computational limitations. Um and so um 42:31 and and so when we are evaluating a policy uh what do economists look for? Uh we look for effectiveness. How much 42:37 does it actually reduce emissions? We look for efficiency. What are the cost of the reductions? And then we look at 42:43 the distributional effects. Um what are how are the costs distributed across the economy? Are some household sectors or 42:49 reg regions particularly harmed? And is there a way we can design our policy that could mitigate some of those uh 42:55 particularly negative outcomes for some particular groups particularly if we want the policy to be uh politically 43:01 feasible. Um so um as Minnie mentioned I wrote a book called Confronting the Climate Challenge US policy options. Um 43:09 this goes through our economic model and presents it and discusses um uh some some modeling results that um I'm 43:16 including it here today. It is a little bit dated. Um, but we really haven't had a reason to update our economic modeling 43:23 of carbon pricing over the last four or five years. It it hasn't been on the table as a as a policy recently. Um, I 43:31 hope that changes and that we can um start cranking out some new more updated numbers. Um, but this will give you a 43:38 flavor of what economists will look for um in uh um in their in the way we look at 43:46 policies. If you want to buy the book, I think you give me I think I will get about a cup of coffee out of it. So, um, 43:51 thank you in advance if you do that. Um, and so, you know, what are the questions we look at? Um, we look at how does 43:58 climate policy affect the supply and demand of energy. We look at how does climate policy affect the prices of all 44:04 goods and services. Uh, we look at how does climate policy interact with the fiscal system. And we look at how those 44:09 impacts change over time. Um, we're going to skip the data. I'm skip the outputs. We do look at a revenue neutral 44:16 carbon tax. So we just this is just an example of a carbon price profile is not an endorsement of a carbon price 44:23 profile. Um we can look at what the emissions reductions would be from that carbon price profile. So you might say 44:29 well you're not getting enough reductions by 2050. So we would say you should um make the policy more stringent 44:36 by having a higher price in the long run. Um most in our model most of the uh reductions were coming from electricity. 44:44 Um the overall uh costs uh varied uh quite a bit by how you what you did with the revenues. Uh but the benefits were 44:54 pretty pretty constant. And we also got a lot of non-climate benefits. These are local pollution benefits. These are 44:59 reductions in PM2.5 um and sulfur dioxide and other types of local air pollutants. And so the 45:07 benefits are pretty uh um uh constant across the policies.

We're going to get lots of lots of benefits um uh from 45:18 these policies. These are pol these policies are winners. And I'm just going to skip through the end here. This one 45:23 might be very interesting for uh for folks. Um the distribution of impacts very quite a bit quite depend quite a 45:30 bit on revenue use. Um so the lump sum, the dividends um the dividends are actually very helpful to uh lower income 45:37 households, the quintile one, the quintile 2 households. uh less uh good for the uh quintile five rich 45:46 households. Um uh but then if you do other things with the revenues uh they are uh more uh regressive. Um so 45:55 you can design a carbon price uh policy that is progressive and that's primarily through using a equalized 46:03 dividend uh to households. Um, so 46:09 I'm like one minute over so where I should be. So I'm just going to finish right here or these last two slides. Um, 46:14 key findings that we find from our our modeling. Um, again these this isn't this is old an old exercise but these 46:21 findings are robust and constant over time. So what we find is you know what we're going to find is that an 46:28 appropriately designed f federal level climate policy can produce significant net benefits. uh the costs do depend on 46:35 how you use the revenues um and what you do with the revenues, but we also found that the non-climate benefits exceed the 46:41 climate benefits. So, we're actually getting the co- benefits of reducing all this local air pollution that's 46:46 associated with fossil fuel combustion is really good for the economy and for for the the people who live in uh the 46:53 United States. Um among the four policy types we can between a carbon tax, a capp trade, a 47:01 clean electricity standard, and a federal gasoline tax. Uh carbon pricing tended to be the most cost effective. Uh 47:07 there's a few exceptions. Uh but I think it's it's pretty reasonable to say that carbon pricing is with a few exceptions 47:14 the most cost effective way of reducing emissions, especially at a moderate to large scale. Um, and the carbon pricing 47:22 gives a lot of incentive to decarbonize the power sector. Transportation emissions are less responsive. Um, one 47:28 thing I I don't think I've mentioned before is that a \$1 carbon price is equal to about a 1 cent increase in the 47:35 price of gasoline. So, a \$20 carbon price will increase the price of gasoline by 20 cents. We've seen car 47:41 we've seen gasoline prices increase by \$2 in the last uh it's gone up \$2 and down a dollar and 47:48 back and forth. over the last u six or seven months. Um and so carbon pricing in some ways is actually noise uh in 47:59 terms of like its effect on gasoline prices. However, we did find that costs are not 48:04 evenly distributed across industries, households and states. I didn't show everything. I did all of that. I did 48:09 show you the household uh results. Um and then we found that you know you can uh offset some of those adverse impacts 48:17 on industries and households through some clever revenue use uh without significantly increasing your aggregate 48:24 economic cost. So there's a trade-off there between equity and efficiency. So you're going to have a little less 48:28 efficiency but you might have a little bit more equity. Policy might be a little bit more politically feasible. 48:34 Um I have some other research um that looks at the employment impacts. It looks at emissions uncertainty under a 48:41 carbon tax. Um, can we build mechanisms to reduce those emissions uncertainty? I've looked at a lot of uh regional uh 48:48 carbon pricing schemes uh in in these what seven states. Um, and with that, perfect. Well, we have a few more things

Wrap-up and Conclusion

48:58 we want to just make announcements on tonight. So, Mark, I just really want to thank you for being with us here 49:03 tonight. Um, I know we have plenty more questions that we weren't able to get to, but we'll definitely have more 49:10 opportunities um for that uh on future sessions. Just a couple more things for folks. A few more quick reminders. Um, 49:19 first is that

our feedback session will be hosted by our carbon pricing action team. We'll have one of these after each 49:26 session in our series. This is in two weeks on September 16th. Um, so that that gives time for those who weren't 49:33 able to be here live to watch the recording or you can review it yourself for anything you missed. And um, like I 49:40 said, you'll have this, like Mark said, you'll have the slides you can look through as well. Um, and this series 49:46 isn't just about hearing from a brilliant speaker. This is a process for fine-tuning our advocacy on carbon 49:53 pricing. So part of that process is hearing from you as participants what your insights are, what are your 50:00 learnings and any feedback that you have. So the diversity of thought is what makes us stronger. So please mark 50:06 your calendar and join us if you can. Join us also for the next session in our series on October 1st. We'll have 50:16 affordability and distributional impacts that Mark gave you a little taste tonight. uh a central consideration for 50:23 policymakers is affordability. On the surface, there is a problem for carbon pricing because the whole point is to 50:30 change behavior through higher prices on pollution. However, carbon prices also raise a lot of money and how 50:36 policymakers use that money can have a big impact on affordability. So the webinar on October 1st will cover some 50:44 recent research from RFF on the carbon pricing affordability nexus including research that shows how carbon price 50:51 revenues can actually improve affordability. So, another reminder for those of you 51:00 from our of our CCL volunteers to log your attendance tonight and then you will be able to find the 51:09 recording, the slides, and the links that we shared tonight on the event page that uh we've put in the chat. Uh it'll 51:17 be there in the next day or two. We also will have it posted on the carbon pricing series page next week, but we 51:24 need a little extra time with the Labor Day weekend to make sure we have time to get that up there. If you're new to 51:30 Citizens Climate Lobby, we encourage you to learn more about us. We invite you to join our informational session that is held 51:37 every Wednesday night at 8:00 p.m. Eastern time and you can RSVP at cclusa.org/info. 51:46 And if you'd like to learn more about our partner RF, you can also visit their uh website which is rff.org. Very easy 51:56 to remember. So please join me in giving one last uh round of applause appreciation for our speaker Mark 52:03 Halfstead. And thank you to all of you for joining us tonight. We look forward to seeing 52:11 you uh in another month for the next presentation. And hopefully we'll see many of you in two weeks for our 52:18 feedback session. Have a great evening everyone. Thank you for listening to this episode 52:24 of Citizens Climate Lobby's training program. You can tune in to more episodes anywhere podcasts are 52:29 available. Inspired by what you heard today? Join [citizensclimate](http://citizensclimate.org) lobby to advocate for bipartisan climate 52:35 solutions. Go to community.cscitizensclimate.org or to find more trainings, 52:40 resources, your local chapter, national action teams, discussion forums, and more. Be sure to like our Facebook page 52:47 and follow us on Twitter and Instagram @[citizensclimate](https://twitter.com/citizensclimate). We also invite all of our listeners to subscribe to our 52:53 YouTube channel for more inspiration. Like what you hear? Recommend us to your friends and make sure to give us 52:59 a five-star rating. It helps us show up on other listeners feeds. Feel free to pass on any suggestions for 53:06 future episodes in the comments as well. And together, we are creating the political will for a livable world.