

GRF REPORT
ON THE
CLEAN TAX CUTS
WORKING GROUP CHARRETTE

At COLUMBIA UNIVERSITY, SEPTEMBER 23, 2016

CO-CONVENED BY

THE GRACE RICHARDSON FUND
ROCKY MOUNTAIN INSTITUTE

&

THE SABIN CENTER FOR CLIMATE CHANGE LAW

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CHARRETTE PARTICIPANTS



Charrette Participants: Back row: Rod Richardson, Chip Comins, Henk Rogers, Steve Nadel. Middle row: Justin Gundlach, David Parham, David Levine, Dieter von Lehsten, Hutch Hutchinson, Dave Koplow, Clay Stranger, Michael Kinsley. Front row: Prof. Michael Gerrard, Sally Coxe, Catrina Rorke, Scott Nystrom, Krae van Sickle, Amory Lovins, Prof. David Wilson. Not pictured: Prof. Travis Bradford, Eli Lehrer, Michael Kinstlick, Trammell Crowe, Rev. Mitch Hescoc, Jimmy Kemp, Dillon Ripley Lanius, Elizabeth Noll, Sarah Hunt, Curtis Probst, Prof. Peter Eisenberger, Stuart Gruskin. Please see Participant List for affiliations.



Planning dinner before the conference (l. to r.): Amory Lovins, Henk Rogers, Trammell Crowe, Rod Richardson, Aaron Burger, Chip Comins.

OVERVIEW OF CTC CHARRETTE RESULTS

On September 23rd, The Grace Richardson Fund, Rocky Mountain Institute, and the Sabin Center for Climate Change Law co-convened a one-day charrette at Columbia University, to explore the potential power of Clean Tax Cuts (CTC) to accelerate clean solutions, and ease gridlock on energy and tech innovation policy, stalled in conflict over climate. The assembled CTC working group, some 35 non-partisan or bipartisan experts in energy, environment, finance, technology, economics, sustainable accounting, efficiency, and politics, sought to:

- Understand Clean Tax Cuts (defined in GRF and SASB white papers)
- Examine pros, cons, and likely impacts relative to current climate policy
- Generate useful approaches to clean tax cuts
- Identify opportunities, barriers and solutions
- Plan next steps

After an initial general discussion, the charrette (perhaps the “mini-charrette” on account of the short one-day format) split into three breakout groups, to explore approaches to measurement; impact on investment and environment; political pathways and messaging for CTC. The afternoon plenary session sought to integrate the findings of the breakout groups, in order to identify both potential barriers and promising opportunities for further development.

The charrette found all the above: useful approaches, opportunities, barriers, solutions and next steps. Post-charrette correspondence among participants also brought out further insights.

The impact group found that CTC applied via capital tax cuts could have an especially strong multiplier effect: driving down costs of capital a little will drive down cost of goods and services a lot, simultaneously accelerating innovation, investment, supply and demand for clean solutions, wherever applied. Rough calculations showed CTC static impacts equivalent to a \$20/ton carbon tax for CTC applied to the energy sector financed by subsidy cuts, up to \$140/ton for dynamic impacts of CTC applied economy-wide, financed by broader tax and regulatory reform.

Overall, the working group found fifteen promising areas: five broad sectors (11 if you count sub-sectors) and four policy applications where CTC would likely be feasible to implement, with high potential impact, good transpartisan appeal and easier political lift. Promising high impact sectors include transportation, energy efficiency, agriculture, carbon materials, all clean fossil fuel and energy innovation beyond wind and solar, corporate green bonds and project finance. Potentially high impact policy applications deserving of further study and development include: clean capital tax cuts; clean repatriation; clean tax, subsidy and regulatory reform; clean expensing. Chip Comins suggested combinations of clean tax cuts with a carbon tax might offer surprisingly powerful synergy, deserving further study.

The working group also identified fifteen areas where CTC faces challenges: five areas where CTC faces mixed barriers and opportunities; three areas beyond the scope of current CTC concept development; and seven areas where further study would be useful. These areas are discussed more fully below.

In general, the charrette found that while CTC's potentially high impact positive approach may make it more appealing than the politically challenged carbon tax, the application of tax cuts to diverse decarbonizing investments presents multiple design challenges that need to be studied and resolved. However, this appears feasible in key sectors, and none of the challenges identified were individually fatal to CTC. The group simply found that some areas are simpler than others, and some perhaps just out of scope. The group also found that some seemingly complex issues have already been considered and successfully resolved by expert groups studying the same issues which arise in sustainability accounting, regulation, and standardization of reporting for securitization. CTC development need not reinvent the wheel. In some cases, we simply need to bring in the relevant expertise from these related areas to CTC open source development.

A number of participants pointed out that CTC's basic optimistic, transpartisan, open source approach to innovation, the pragmatic impulse to "boost the positive flow" to all new clean solutions by removing barriers, because it is easier to go with a flow than fight it, applies to the CTC development post-charrette. The way forward is to develop what is easiest first, to erode the barriers by flowing around them, bringing in additional experts and stakeholders as needed to remove any such barriers. Whatever seems to offer the highest positive impact with the least barriers, that is where to focus initial efforts in CTC development.

With respect to next steps, Eli Leherer and Jimmy Kemp announced that R Street Institute, the Jack Kemp Foundation, and GRF (with ConservAmerica and others) would be pursuing further joint research & development of the CTC concept, focussing on the promising areas suggested by the charrette. All CTC working group participants were invited to collaborate in the ongoing effort. Many participants offered various levels of ongoing involvement, from informal consultation to formal collaboration. David Levine, Trammell Crow and Chip Comins invited working group participants to come talk about Clean Tax Cuts at Earth Day Texas, AREDAY Aspen and American Sustainable Business Council (ASBC) events. To finance these efforts, Trammel and GRF jointly announced the Clean Capitalism Challenge, a \$100,000 charitable fund dedicated to CTC R&D, plus an additional \$100,000 "rolling" matching challenge grant, to challenge fellow philanthropists to invest jointly in the research and development of Clean Tax Cuts, to help turn capitalism into clean capitalism. Further information on the Clean Capitalism Challenge will be announced soon. GRF will coordinate ongoing efforts, and keep all CTC working group participants informed.

The short one-day format of this first design charrette for Clean Tax Cuts was both extremely productive of new insights, but also too short to allow more ambitious goals, such as a full sector by sector CTC design. Further charrettes could likely achieve that goal.

I would personally like to acknowledge and thank: Amory Lovins, for suggesting this charrette; RMI, Clay Stranger, Michael Kinsley and Elizabeth Halliday for excellent facilitation and moderation; Andy Sabin, Michael Gerrard and the Sabin Centre for Climate Change Law for providing such a wonderful venue at Columbia University; Trammell Crow, for his generosity and philanthropic leadership; each participant quoted herein for permission to share their key, original insights and suggestions with authority; and all participants for generously sharing their amazing collective brain-power. Lastly, thank you, everyone, for all future comments and collaborations which will be most welcome, always.

Rod Richardson, President, Grace Richardson Fund

CHARRETTE VENUE AT COLUMBIA UNIVERSITY



Rod Richardson opened the charrette at The Sabin Center for Climate Change Law at Columbia University's Jerome Greene Annex, September 23, 2016. Pictured via Skype from Washington, DC was Jimmy Kemp of the Jack Kemp Foundation.



Attendees listen to ideas and breakout group findings during the days proceedings.

LIST OF CTC OPPORTUNITIES, BARRIERS & FINDINGS

Promising Sectors:

- Transportation
 - - high Impact, well reported metrics, CTC easy to apply
- Energy Efficiency (products, corporate operations, buildings)
 - broad economy-wide tax cut, high impact, good metrics & conservative appeal
- All Clean Tech Innovation beyond Wind & Solar - fixes market distortion favoring W&S
 - All other clean energy innovation, storage, grid upgrades
 - Air or emissions capture to carbon products and/or sequestration
 - Profitable fossil fuel innovation
 - Waste to clean energy + carbon materials
- Agriculture - excellent conservative appeal, metrics need further study
- Corp. Green Bonds - pre-existing CTC use here with high impact & lessons for CTC

Promising Policy Applications:

- Clean Capital Tax Rate Cuts - high impact, drives down costs, multiple points of leverage
- Clean Repatriation - offers simple, feasible, high impact (>\$2.4T) win-win solution
- Clean Expensing - intriguing idea that needs more study
- Combining Clean Tax Cuts + Carbon Tax + Tax, Subsidy & Regulatory Reform
 - Extremely high impact combo: 3-4 times impact of CTC or carbon tax alone

Mixed Barriers & Opportunities:

- Corporate Income Tax
 - Uneven tax code distortions from sector to sector
 - Mixed barriers and opportunities for implementation
- Tax, Subsidy & Regulatory Reform
 - Efficient clean tax code would deliver high environmental and GDP impact
 - CTC can offer more value in new tax rate cuts vs subsidies or other tax breaks
 - CTC offers corporations a good deal to induce reform, eliminate subsidies
 - Such reform never easy, but very worthwhile
- Wind & Solar (subsidy is a barrier for 2 - 7 years... then an opportunity for CTC)
- Utilities (Some see barriers in state regulatory differences. Others see opportunity)
- Nuclear (controversy over impacts, business case, profitability, applicability)

High Barriers or Beyond the Scope of CTC:

- Tax exempt organizations
- Supply chain and life-cycle analysis
- Import tariffs

Areas for further study:

Incentivizing individual innovators; role of subsidy in pre-profitable innovation; applying CTC to individual income taxes; conglomerates and spin offs; mixed or contentious impacts; baseline vs. improved performance; CTC relationship to existing regulation and subsidies; CTC application to land use, agriculture, forestry; implementation plans, modeling and impact analysis for promising sectors and applications.

New Approaches Suggested to Clean Tax Cuts:

- Prof. Travis Bradford applied Weighted Average Cost of Capital (WACC) analysis to CTC
 - shows cuts to the capital tax rates investors pay can have an especially big impact:
 - powerfully drives down cost of capital, cost of outputs, accelerates investment
 - increases both supply and demand simultaneously for all clean solutions.
- The impact breakout group proposed “a rough cut and back of the envelope” method for calculating the carbon tax equivalent impact from CTC scenarios.
 - CTC replacing \$100B energy subsidies = \$20/ton static, \$40/ton dynamic impact.
 - Economy-wide, CTC replacing \$350 billion tax breaks = \$140/ton dynamic impact
 - \$20/ton carbon tax + CTC + energy subsidy elimination could have total static impact of \$60/ton, or dynamic impact of \$80/ton (3X- 4X carbon tax alone)
- Sustainability Accounting Standards Board (SASB) analyst David Parham provided a SASB white paper showing how SASB standards and metrics can be used in combination with the Sector Decarbonization Approach (an emission target setting protocol) to set tax rates across a wide variety of sectors, economy-wide.
- Additionally, David showed how CAFE data reporting could be used to set tax rates for the auto & truck sector.
- Justin Gundlach proposed the use of CAFO regulatory data to set tax rates for certain agricultural livestock operations.
- Post-charrette, an advisor to the CTC working group suggested Green Bond Principles may suggest elegant solutions for CTC design issues raised at the charrette.
- Case studies, suggested by measurement group, to analyze CTC implementation/impact on individual entities, such as a conglomerate, a small clean tech start up, or a farm.
- Michael Kinstlick suggested Clean Repatriation.

New Insights from CTC Charrette:

- Prof. Peter Eisenberger pointed out that Clean Tax Cuts is part of a larger paradigm shift to positive, optimistic, reward-based approaches to climate and energy, in contrast to apocalyptic, angry, paranoid fear and punishment-based approaches.
- CTC, applied to capital taxes that investors pay, would deliver a very high impact.
- Clean Capital Tax Cuts are very different from, more powerful than subsidies, by driving down, rather than increasing, true costs; by eliminating tax credit market gatekeepers.
- Taxes that investors pay offers a powerful point of leverage on corporate behavior, even in instances where corporate income taxes do not because of tax code distortions.
- CTC applied to taxes on debt interest (green bonds) could have a powerful impact.
- CTC could have a decarbonization impact comparable to a carbon tax.
- CTC financed by broad tax reform could deliver an especially powerful growth and decarbonization impact; high impact from applying CTC beyond just the energy sector.
- CTC paired with a carbon tax plus subsidy elimination can deliver, not 2X, but 3X to 4X as a much impact as CTC or carbon tax alone, with a net positive benefit to GDP.
- CTC developers do not need to reinvent the wheel.
- Complex issues for different sectors have in many cases already been resolved by experts setting standards for sustainability accounting, regulation and securitization.
- For some sectors, like transportation, the issues may not be complex.
- CTC developers should focus on high impact, low barrier areas first.

CHARRETTE INSIGHTS



Clean tax cuts and a carbon tax may work well together: 3-4X the impact of either alone. Rod Richardson, inventor of the clean capital tax rate cuts policy concept, with Prof. David Gordon Wilson, Prof. of Engineering, Emeritus, MIT; inventor (in 1973) of the revenue-neutral carbon tax.



Paul Walker and Rod Richardson during one of the breaks. Paul and others argued CTC would have a strong impact on the power sector, via utilities, driving down the cost of all clean energy by reducing cost of capital (despite state level regulatory differences).

NEW APPROACHES AND INSIGHTS

The CTC working group generated a number of useful new approaches to CTC, with resulting new insights:

1) Prof. Travis Bradford applied weighted average cost of capital (WACC) analysis to CTC, to show how cuts to the capital taxes investors pay can have an especially big impact and powerfully drive down costs, accelerate investment, and increase both supply and demand simultaneously for all clean energy and decarbonizing products, goods and services.

In post-charrette correspondence (attached), Bradford explains that “clean tax cuts at the investor level” largely “will go to driving down the imputed interest rates” which lowers cost of capital, which would have

“a major impact on reducing the cost of delivering the output from the asset – somewhere between 15 and 30%, depending on specific circumstances. A clean energy solution would see its levelized cost of electricity fall by this amount.”

The chart below from Bradford’s forthcoming textbook shows that

“Simply, reducing project WACC by a modest amount, the levelized cost of delivering the output of that asset falls. This means that the investors are not only getting tax abatement, but they are creating the conditions that drive down the cost of clean solutions directly. This WACC reduction will take a technology that may be a 25% too expensive and make it cost effective, or one that is already cost-effective would become 25% cheaper than other solutions. Cheaper solutions have the effect of creating substantially larger potential markets for these technologies opening up many more options for cost effective deployment – simply, clean tax cuts at the investor level increase the supply of clean solution investment opportunities and the demand for them simultaneously.”

Original WACC	Rate Reduction			
	3.5%	3.0%	3.5%	2.0%
9.0%	-26.8%	-23.2%	-19.5%	-15.7%
8.0%	-28.0%	-24.3%	-20.4%	-16.5%
7.0%	-29.3%	-25.4%	-21.4%	-17.3%
6.0%	-30.6%	-26.6%	-22.4%	-18.2%

Assumptions: Amortized capital costs only; No O&M or fuel costs; 25 year lifetime.

WACC analysis offers fresh insights that supports the GRF white paper conclusions that:

- **CTC, applied to capital taxes that investors pay, would deliver a very high impact.**

- Clean Capital Tax Cuts are very different from, and more powerful than subsidies, by driving down, rather than increasing, true costs.
- Taxes that investors pay offers a powerful point of leverage on corporate behavior, even where tax code distortions mean corporate income taxes do not.
- CTC applied to taxes on debt interest (green bonds) could have a powerful impact.

2) The impact breakout group proposed “a rough cut and back of the envelope” method for calculating the carbon tax equivalent impact from CTC. Post-charrette correspondence explains this “rough” calculation applied to the energy sector, CTC replacing energy subsidies:

U.S. CO₂ emissions = ~5,000 million metric tons (MMT) per year

So presuming a simple, uniform carbon tax of \$1.00 per ton = \$5 billion in revenues (5,000 * 1 million * \$1.00 per ton = \$5 billion) before behavioral responses.

According to workshop materials and the conversation, the tax advantages/tax expenditures in the federal budget for the energy industry (all types) total around \$100 billion per year.

Divide your “available pool” of \$100 billion by the \$5 billion in revenue/tax expenditure per \$1.00 per ton equivalency, and you have an implicit price or incentive of \$20 per ton.

[N]ote, too, that the calculation above is an immediate, short-term, static change. Energy and climate policy tends to be long-term and needs to take account of dynamic responses.

Adapting this calculation to include Mankiw’s dynamic scoring which allows a 2:1 ratio of tax cuts to subsidy cuts, the plenary group and post-charrette correspondence contemplated tax reform driven scenarios where CTC, applied economy-wide to all clean solutions, replacing \$350 billion of subsidies and other tax expenditures, could have a dynamic impact equivalent to a \$140/ton carbon tax. In other scenarios, a \$20/ton carbon tax paired with CTC plus energy subsidy elimination could have a total static impact of \$60/ton, or dynamic impact of \$80/ton (three to four times the impact of CTC or a carbon tax alone).

While these are very rough calculations, this approach did suggest the following insights:

- CTC would have a decarbonization impact comparable to a carbon tax.
- CTC financed by broad tax reform could deliver an especially powerful growth and decarbonization impact.
- CTC paired with a low carbon tax plus subsidy elimination can deliver the same impact as a much higher carbon tax, with a net positive benefit to GDP.

3) In SASB white paper (available from GRF), David Parham introduced a hybrid of SASB metrics applied to the Sector Decarbonization Approach (a target setting method used by the WRI GHG accounting protocol) as a feasible tool for setting CTC tax rates across different sectors with diverse decarbonization issues, economy-wide.

4) David also described how CAFE data reporting could be used to set tax rates for the auto & truck sector. Post-charrette correspondence explaining this is attached.

5) Justin Gundlach proposed the use of **CAFO regulatory data to set tax rates for these kinds of agricultural operations**. Post-charrette correspondence explaining this is attached.

These approaches suggested by David and Justin lead to the helpful insights that:

- **CTC developers do not need to reinvent the wheel when converting metrics to tax rates.**
- **Complex issues for different sectors have in many cases already been resolved by experts setting standards for sustainability accounting, regulation and securitization.**
- **For some sectors, like transportation, the issues may not be complex.**

While the above new approaches lead to new insights, sometimes new insights lead to new approaches:

6) **For the measurement working group, the insight that corporate income tax preferences and sector differences posed challenges to CTC implementation led to the proposal to use case studies, to examine in detail how CTC would be applied, and what the impact might be, for individual companies or taxpayers, such as a big diversified conglomerate like GE, or a small clean tech start up, or a farm.**

7) **The charrette reaffirmed the value of the basic, optimistic, positive, open source approach in both the CTC policy, and GRF's approach to CTC development, applying CTC first where the barriers are lowest and potential impacts highest.** But various participants expanded upon that approach, and placed it in a larger context

- **Prof. Peter Eisenberger offered the insight that CTC is not just a tax policy, but, like his own work at Global Thermostat, part of a larger paradigm shift.** Peter describes a shift from a negative, angry, apocalyptic, eco-puritanical fear-based approach focussed on demonizing carbon use, beating down negative externalities and punishing eco-sinners, to a positive optimistic, reward-based approach to the future. CTC fits in as the practical fiscal policy embodiment of that paradigm shift. Peter argues our focus should switch to valuing carbon positively, not as an existential threat, but as a precious material that should be used everywhere and not wasted. CTC does just that, by acting on taxes investors face. Peter believes CTC can provide both a practical “positive feedback loop” and an optimistic policy vision, that will help create a “human carbon cycle,” mimicking the bio-carbon cycle, and help bring about a shift to what he calls the “Renewable Energy and Materials Economy (REME).”
- **Peter's remarks mesh with the political group's suggested positive messaging approach:** since current negative approaches fail to make legislative progress, CTC's positive approach can make headway by using language de-emphasizing climate change alarms, emphasizing instead positive solutions (“energy and materials innovation” and low taxes) and positive outcomes (“cheap, clean, efficient, energy” and “innovative, advanced energy, cars, homes, industries and materials” and “clean capitalism”).

CHARRETTE FRIENDS



GRF thanks Andy Sabin (a big New York “THANK YOU!”) for immediately grasping the potential of clean tax cuts to make capitalism clean. And of course, for his encouraging support for CTC development, generously making it possible to hold the CTC Charrette at Columbia University, with the kind help of our co-hosts: the Sabin Center for Climate Change Law and Prof. Michael Gerrard; and Amory Lovins and Rocky Mountain Institute.



GRF also gives Trammell Crow a big, Earth Day Texas-sized “THANK YOU!” for understanding the importance of new, conservative, pro-capitalist approaches to clean energy and tech innovation. And for jointly announcing with GRF the Clean Capitalism Challenge Fund, challenging all philanthropists and capitalists to join the CTC working group in our shared mission to make capitalism clean.

PROMISING SECTORS AND APPLICATIONS

Promising Sectors:

1) Transportation: At 26% of GHG emissions in 2014, the transportation sector is the second largest contributor to climate change, after the power sector. The impact breakout group felt CTC would have a high impact here, greatly accelerating the adoption of low emission and energy efficient vehicles. SASB analyst David Parham felt CTC would be easy to apply here because the metrics are easy, and industry self-reporting is very good already. (Attached find confirming post-charrette research and analysis by David).

2) Energy Efficiency (EE) for products, corporate operations, and buildings owned by individuals and small businesses: While energy efficiency is more of a metric than an economic sector, it is nonetheless an excellent target for CTC, because it offers a benign, all-positive point of leverage over the entire economy. Indeed this CTC application is so huge we can count it as three sub-sectors.

The impact group felt there would be a high, economy-wide impact (to both emissions and GDP) from applying CTC to energy efficiency, accelerating EE in products, buildings, and corporate operations. CTC would tend to make EE products and practices cheaper and dominant. In post-charrette discussion, Paul Walker clarified an important reason to apply CTC to EE: because CTC in the power sector will tend to drive down the price of clean energy. While that is a good thing, cheaper energy could reduce some EE investment. So incentivizing EE throughout the rest of the economy using CTC would accelerate a more balanced decarbonization driven equally by cheaper efficiency and cheaper clean energy.

David Parham noted that EE metrics are well established for corporate operations, PP&E, products, and buildings, which, at first impression, would likely be easy to translate into tax rates, likely more simply than using GHG metrics. He noted CTC would be applied differently to products (similar to transportation sector CTC application) versus buildings or corporate operations (similar to Sector Decarbonization Approach). David recommended doing further research and analysis in this area.

In plenary discussion, participants noted that energy efficiency can be a more appealing metric for conservatives than GHG emissions, as we need not mention climate change, it is just all about capitalist efficiency, controlling costs and boosting profits. EE is entirely consistent with “cheap clean energy” and “energy innovation” which language the political breakout group recommended for CTC messaging. Since energy efficiency applies to you, me, Apple, Walmart, everyone, and is cheaper and more profitable per watt than building any kind of power plant, that means CTC applied to an EE metric can profitably deliver a broad supply side tax cut, which will also have conservative appeal. Also, CTC applied here could directly benefit many blue collar workers in manufacturing and construction trades, while lowering the cost of living, for an added benefit to middle class prosperity.

5) All clean solutions beyond wind and solar (6 - 9 sub-sectors, includes all other renewables and clean energy, resilient power transmission, storage and grid management systems; waste to

recycled carbon materials plus clean energy systems; clean fossil fuel innovation, nuclear innovation): Participants noted that current subsidy and regulatory regimes favor wind and solar, the poster kids of environmentalism, over other kinds of clean energy and decarbonizing investments. This creates a barrier for CTC in the wind and solar space for two to seven years (but a future opportunity when those hard won subsidies end). It also creates a present CTC opportunity, since the playing field needs to be leveled somehow for all other potentially more powerful carbon negative innovation now taking place without the same level of regulatory and subsidy support.

Since this space includes powerful carbon negative approaches, some participants felt this was a critical area for CTC application.

It is also a critical area for CTC messaging. The political breakout group stressed the desirability of talking about “clean energy innovation.” You can’t talk like that and leave out these technologies without a serious disconnect. Further CTC energy and materials innovation acceleration would have good conservative appeal, as this sector includes many carbon materials, fossil fuel and baseload energy innovators disfavored by “left wing” policies. So applying Reagan style tax cuts here would deliver a very consistent conservative message, and correct government created distortions, and deliver a more powerfully balanced kind of decarbonization that fixes problems posed by distorted hyper-growth in just wind and solar.

The impact group found CTC would likely accelerate diverse clean energy and waste reducing carbon materials technologies, including entrepreneurial companies like Global Thermostat, ZHRO, Sierra Energy, Algae Systems, Blue Ion, and Tesla’s battery division. By reducing the cost of capital, CTC would accelerate investment and innovation, and drive down costs, leading to abundant, cheap, reliable storage, transmission, clean energy and carbon materials, reducing all kinds of waste and GHGs in the process.

Paul Walker offered the following post-charrette commentary:

Clean Tax Cuts would reduce the cost of capital for Carbon Capture and Sequestration (or Carbon breaking approaches like the XPrize promise to provide \$20 million in prizes to firms that can demonstrate an economically feasible way to crack CO₂ molecules, breaking the carbon from the oxygen). The market value for solving the CO₂ problem has been estimated at \$1 trillion. Every country in the world should want to solve the CO₂ problem by finding the technological solution – Clean Tax Cuts remove an important barrier to that pursuit by eliminating taxes from the costs.

This area of focus also gives CTC additional impacts, reducing problems like landfill and toxic waste. One issue to consider in this diverse area is how to incorporate new technologies into CTC, as they arise, without having to re-write the law. A metrics based law would help, along with a mechanism to test and verify technological claims.

6) Agriculture: Various participants felt farming would be a good place to start CTC application, with good conservative appeal centered on the small farmer. However, the measurement group warned there might be many unsettled questions to be explored regarding the true

decarbonization potential of various controversial land use, agriculture and forestry practices. David Parham advised that there was poor metric reporting in the ag sector, in general.

Post-charrette, some positive developments on agriculture. Justin Gundlach suggested a way forward on agriculture in an email:

My suggestion about possibly focusing the CTC on agriculture is the result of three premises:

- *unlike the energy, transportation, and building sectors, the agriculture sector has yet to standardize processes for inventorying and reducing GHG emissions – which means that there is almost certainly a lot that can be done relatively cheaply to reduce ag GHG emissions;*
- *agricultural policy tends to operate through positive incentives rather than negative ones (negative ones tend not to make it past political veto points); and*
- *concentrated animal feeding operations (CAFOs) have been defined legally for purposes of compliance with the Clean Air Act and Clean Water Act, which means that their owner/operators already have various technical and administrative mechanisms in place to capture and report information about pollution. CAFOs are also industrial operations whose parameters, inputs, and outputs, are already analyzed carefully for various purposes unrelated to pollution control.*

Taken together, these points suggest to me that if you give CAFOs even modest incentives to emit less, they'll quickly find ways to emit less.

In addition, Elizabeth and Dennis Kucinich have graciously extended an offer to help connect the CTC working group to the Rodale Institute and other ag researchers with whom they work, for a better understanding of regenerative farming practices, metrics and scientific consensus.

7) Corporate green bonds and impact finance: Charrette participants noted that not only are green bonds and impact investing part of the same positive, opportunity-focussed paradigm shift as CTC, some kinds of municipal or agency tax exempt green bonds are actually a pre-existing, highly successful CTC application which bear out the basic CTC concept.

Post-charrette, a CTC working group advisor with expertise in this area pointed out that of the roughly \$75 billion dollar 2016 green bond market, 85% is tax exempt, while taxable corporate green bonds lag at only 15% of the green bond market. Apparently, tax exemption creates a roughly 600% larger market.

CTC tax rate reduction applied to the corporate green bond market could make this sector skyrocket. Indeed, our green bond market advisor confirms, post-charrette, that Travis Bradford's WACC analysis correctly predicts that CTC, mathematically, would drive down cost of capital and outputs, and increase investment, and certainly would be on point for bond market finance of energy projects.

Our advisor also pointed out that green bond development has already confronted and solved many of the issues baffling some CTC charrette participants, who are confronting these questions for the first time. Green bond markets have been developed entirely privately over the last decade, with no supporting legislation, self-regulated and shaped by a Green Bond Principles (GBP), the first version of which our advisor drafted seven years ago.

When asked “How do Green Bond Principles define a green investment?” the jaw-dropping, and brilliant, answer was: “They don’t. They let the market decide what is green.” Green Bond Principles insure that happens accurately by recommending high voluntary standards for transparency regarding definition and tracking of use of proceeds, rigorous impact reporting supplemented by auditing, verification and rating, so green investors are empowered to vote with their money for what is truly green. (The latest version of Green Bond Principles is attached.)

That means, not only do green bonds present a highly promising area for CTC development, the collective experience of green bond developers can offer elegant solutions for CTC.

The green bond model suggests it may be possible to implement CTC in such a way that there is no need for legislation to define all permissible clean investments. GBP neatly leaves an opening for new technologies, which is critical. Something like GBP or green bond ratings could be used to set tax rates, perhaps. Making such a voluntary “light-touch” market mechanism reliable and conflict-free for tax rate setting purposes is worth some study. Alternatively, as a slightly more directive approach, it may be sufficient for CTC legislation to lay out quantifiable metrics where scores relative to a moving baseline earn degrees of tax rate reduction. CTC impact reporting for green bonds, might be much like current tax reporting: taxpayers self report impact; they and their CPAs face the same legal responsibility to report truthfully; independent verification and clean bond and corporate ratings provide a cross check; all of which is useful data for both investors and IRS audits if needed. Resulting impact scores determine tax rates for green bond holders on interest rates.

Promising policy applications:

1) Clean Capital Tax Cuts: Capital tax cuts are at the heart of the CTC concept. The impact breakout group found that the strongest kinds of taxes to target for the highest clean tax cut impact would be capital taxes paid by investors on both debt and equity returns. (See page 3: Prof. Bradford’s WACC analysis shows capital tax cuts can have a big impact on lowering costs of clean solutions.) Elaborating on his charrette remarks, Prof. Travis Bradford offered the following post-charrette discussion:

Optimizing Clean Tax Cuts –

In thinking about the most effective way to use tax reduction to target clean energy (or resource) deployment, it seems definitional that the goal is to encourage the most capital investment in targeted technologies. Doing so is most likely done at one of three levels of taxation around clean investment – 1) at the corporate level of firms deploying these assets, 2) at the project level for firms developing these projects, or 3) for investors who provide the financial capital for these capital intensive projects. The most direct mechanism for achieving the desired outcome is the third. Corporate tax abatement is too diffuse and is likely to achieve perverse outcomes of investment strategies by firms, depending on exactly how the tax cut is structured. Project level tax abatement is not effective because of the low level of project level taxes paid for these

types of assets until the heavy depreciation burden and interest expense have been burned through at the project level. Incentivizing capital providers through strategies similar to municipal bond tax abatement for interest and dividend income from approved investments will direct capital specifically to those assets and will be instantly realizable by the investors.

Plus, many design options exist – partial tax abatement, tax abatement based on the realization of the project performance, double abatement in the form of carbon capture and sequestration, declining abatement potential over time to incentivize accelerated investment. It is super flexible. Also, it probably just simply corrects for existing distortions in the tax code through MLPs where certain conventional energy assets have pass-through status and only one level of taxation. This levels the playing field somewhat for clean assets.

This insight is particularly significant in light of the finding by the measurement group that CTC might face a barrier when applied to corporate income tax, when some large corporations like GE pay low effective tax rates. One solution to this barrier is that other capital taxes paid directly by investors offer a superior point of leverage that is not subject to this defect, that can strongly influence behaviors even of corporations that pay low tax rates, because ultimately investors call the shots at the board level, and in project finance.

In further post-charrette discussion, Prof. Bradford pointed out the clear distinction between CTC's use of capital tax rate cuts, in contrast to price support subsidies like the ITC and PTC for wind and solar. These tax credits, he pointed out, create a "stranglehold on the market, holding it back." They limit the number of participants, by creating barriers to entry, financial "gatekeepers" guarding access to the tax credit market, third party interlopers who get most of the benefit of the tax credits rather than the actual producers. This robs the economy of most of the benefit from subsidies, not that there is much to begin with. (Price support subsidies reduce GDP.) Not only do capital tax rate cuts drive down real costs, while subsidies raise the true cost. They also "open markets to rapid growth by removing those gate keepers" making it simpler and more profitable for entrepreneurs and investors to jump in. Easier for capital to flow to these projects. Swapping tax credit subsidies for CTC, he predicted "would make the market size explode, not just in dollars, but from about 15 firms that can handle the complexity of tax credit finance, to tens of thousands of firms of all sizes. Many of the contractors doing construction will suddenly be building and installing wind and solar, and other energy systems."

Meanwhile, the tax credits market gatekeepers would switch into more productive banking, doing more green IPO's, green bonds and corporate finance, green project lending.

2) Clean Repatriation: Many participants felt this spin off from the core CTC concept, suggest by participant Michael Kinstlick, offered a very simple CTC application with relatively easy political lift, good transpartisan appeal (puts "clean" back together with "patriotic") and most of all, potential for a big, quick, bang for the buck: \$2.4 trillion that could be rapidly invested in clean projects and the US economy. But curb your enthusiasm. Very unlikely all \$2.4 trillion would go to clean investments. Some participants warn of: competition from other interest groups with other ideas for this money; opposition from those like Bernie Sanders who simply want to force US corporations to pay full tax on all profits, repatriated or not, and resistance

from some like Trump who propose a one shot, no strings tax holiday, at 10% repatriation tax rate or less.

Still, clean repatriation could offer an interesting bridge between these competing views. Here's a formulation that arose out of post-charrette discussions:

GRF recommends clean repatriation should not be a one-shot tax holiday, but a permanent feature of the tax code, as follows. Each year, corporations could repatriate profits for a low repatriation tax rate less foreign taxes paid, provided that the difference (the "clean difference") - between taxes paid and what would be owed at the full US corporate tax rate - must be invested in any decarbonizing investment of the corporation's choice. Including any of the promising sectors mentioned above, plus wind and solar, or green bond financed projects. This would include PP&E upgrades at highest energy efficiency possible, something most corporations would want to do if they had funds available. GE, with over \$104 billion offshore, could plow the "clean difference" profits into its existing wind, solar, hydro or efficiency products divisions for faster buildout. Apple, Microsoft, IBM, Google, Cisco and Intel, with over a combined \$428 billion offshore, could build even more of the huge solar/wind farms they are already hooking up to power their operations, or fully capitalize many other decarbonizing tech innovations they are already developing. The point is to provide multinational corporations with dedicated, ongoing source of funds for decarbonizing investments, and a good reason to do even more of the good stuff they already want to do. That is the way to make decarbonization easy and profitable. Don't force folks to do something they don't want to do. Just remove barriers and boost the existing flow to the good stuff. Go with the flow. In this way, Clean Repatriation could offer an easy, appealing, high impact win-win solution for all parties.

3) Clean Expensing: This concept is rated as "promising" more by virtue of being intriguing to charrette participants, than from any actual collective understanding or assessment of true potential. The idea is simple: clean solution projects, in the form of carbon capture, clean energy or highly efficient PP&E investments, would be rewarded by super-accelerated depreciation, perhaps immediate expensing for the most carbon negative solutions. Clean expensing basically repurposes the concept of accelerated depreciation and "immediate expensing" and retargets it to reward clean solutions preferentially over more wasteful investments with negative side effects.

4) Combining Clean Tax Cuts with a Carbon Tax plus subsidy and spending cuts: Chip Comins proposed that exploring combinations of this sort would be very appealing to carbon tax proponents because it offers a much higher impact for less carbon tax.

The calculation method proposed by the impact group suggested that a \$20/ton carbon tax paired with CTC plus energy subsidy elimination could have a total static impact of \$60/ton, or dynamic impact of \$80/ton (3X-4X the impact of CTC or carbon tax alone). That is so because, on a static basis, the \$20/ton carbon tax pays for \$20/ton of clean tax cuts (so that a combined \$40/ton impact), and then \$100 billion of energy subsidy cuts pays for another \$20/ton of CTC, for a total of \$60/ton static impact. On a dynamic basis, as suggested by Mankiw, the subsidy cuts allow 2X the amount of offsetting CTCs, or \$40/ton, which raises the total to \$80/ton. And note that this combination still delivers a result where there is a net reduction in taxes, spending and the size of government, so it will have appeal for some conservatives as a

government reducing, growth inducing tax cut. Certainly, it would be politically easier than a straight \$80/ton carbon tax.

This combination also directly solves criticisms of the carbon tax that it harms growth, raises energy prices, and does not guarantee a shift to clean energy or directly spur innovation. CTC fills those gaps.

An overwhelmingly powerful, double barreled carbon tax + CTC policy, with 3X stronger environmental and GDP benefits on the tax cutting side, might also help end the debates about what to do with carbon tax revenue. There simply is no other policy that can be paired with a carbon tax that has the same enormous environmental impact. Anyone who proposes otherwise is likely confused, or not serious about climate risk.

Ending the revenue debate would also end the festival of rent seeking that transforms left wing climate coalitions into bitterly squabbling dysfunctional factions, as is currently the case in Washington state, where the Democratic Party and some environmental groups have opposed the revenue neutral carbon ballot initiative on the grounds that the revenues should be spent on social justice programs and other concerns. Revenue-neutrality is apparently out the window.

GRF believes the CTC+carbon tax combo offers very interesting area for study, and welcomes such research by fellow CTC developers. Certainly it is strong medicine.

That said, GRF considers it prudent to go as far as we can with an all positive solution that punishes no one, before we start raising anyone's taxes. Medical ethics advises: "First, do no harm." It may be that CTC alone, or with other positive paradigm solutions, can get the job done. The negative political and economic side effects of a carbon tax mean it should be used cautiously, in a carefully balanced, negative-impact reducing manner, and perhaps only as a last resort. Still, the combination, or various permutations thereof, could prove necessary, and should be studied. Some variations may work better than others.



Catrina Rorke and Sally Jewell Coxe. Catrina thought agriculture would be a promising sector for CTC, with good conservative appeal. Sally liked that CTC could create an incentive for rainforest preservation.

MIXED BARRIERS AND OPPORTUNITIES

The measurement breakout group identified several areas with barriers. However, on closer inspection, it appears three of these areas offer perhaps promising opportunities as well, but with challenges.

Areas with mixed barriers and opportunities generally are all heavily regulated or subsidized or otherwise distorted by existing policies. These include:

- **corporate income tax**, because tax breaks are unevenly distributed between industries resulting in a wide variation in effective tax rates.
- **wind and solar**, both heavily subsidized for the next 2 - 7 years;
- **utilities** which are unevenly regulated across the 50 states;

Such distortions present an apparent barrier to uniform CTC adoption and impact. However, these kinds of barriers may also present some opportunities, inefficiencies inviting the use of CTC to correct these very distortions. And in some cases, the barrier is more illusory than real, or more temporary than permanent.

1) Corporate income tax distortions are not necessarily a real barrier everywhere. There are many corporations that pay significant taxes. In the transportation sector, for instance, profitable corporations pay an average effective tax rate of around 28%. So CTC applied to auto and truck sector corporate income tax could have a strong impact. Since the average effective tax rate for profitable US companies is 27.6%, one would expect that economy-wide, CTC applied to corporate income tax would in general have a significant impact.

Corporate income taxes are one form of capital taxes, so wherever effective corporate taxes are significant, CTC will have significant impact, and could be applied. However, it would be prudent to target ALL OTHER capital taxes that investors face as well — since these are not subject to the same tax code distortions, to maximize impact on corporate behavior via investor influence. Doing so will have many benefits, one being that if CTCs are spread across all capital taxes, the rate reduction does not need to be that large to have a strong impact. We need not shrink the tax base.

Clean tax cuts can be effective without extreme tax cuts.

However, it is true that thousands of existing tax breaks allow some corporations to pay very little. Yet this fact is as much an opportunity for CTC as a barrier.

2) Tax code distortions present an opportunity to clean up the tax code, using Clean Tax Cuts as a powerful tool to induce tax, subsidy and regulatory reform. Since clean tax cuts are more effective at attracting new investment and fueling real growth than subsidies, and since higher growth allows us replace a lower amount of subsidies with a higher amount of clean tax cuts, CTC can potentially induce corporations (and legislators) to give up many other less effective subsidies and tax code distortions. \$1.50 of clean tax cuts could replace \$1 of farm subsidies in agriculture, for instance, and likewise in transportation, \$1.50 of CTC replacing \$1

of subsidies for hybrid/electric vehicles. This would stimulate real growth, producing a budget neutral or even revenue positive dynamic effect, while reducing taxes and spending.

These promising areas could in fact act as phase 1 CTC demonstration projects, illustrating the power of clean tax cuts to clean up the tax code, and deliver, simultaneously, powerful growth and decarbonization.

Energy efficiency offers an economy-wide CTC application that must be financed by tax and subsidy reform. Phase 1 Energy efficiency CTC pay-fors would logically be EE subsidy cuts. But phase 2 could deliver much deeper, higher impact clean tax cuts in exchange for other kinds of broader tax break elimination.

Indeed the impact group's carbon tax equivalent calculation approach demonstrates that the key to really high impact from CTC, in the \$140/ton range or higher, is tying CTC to broad tax, subsidy and regulatory reform.

GRF sees the goal of CTC as not simply to eliminate waste and encourage efficiency in corporate and personal behavior, but in the tax code itself. The biggest policy goal of CTC is a Clean Tax Code. One that fosters growth, innovation, efficiency and reduces waste. In order to both maximize prosperity and minimize climate risk, we need to wipe inefficient subsidies and tax breaks out of the tax code, and replace them with efficient, clean tax cuts, that drive both prosperity and clean solutions.

However, while overall tax code reform may be a high impact target, and a big opportunity, it is not necessarily a quick and easy one. Worthwhile, but requiring detailed planning to execute properly. A phase 2 goal.

3) Wind and Solar — Temporary barriers, present and future opportunities: Participants generally agreed the high level of subsidy support enjoyed by wind and solar (and not enjoyed by other clean solutions) creates a temporary barrier, since wind and solar lobbyists are likely to be unwilling to trade in hard won benefits for a new policy they do not yet understand. But those subsidies begin to phase out, from 2017 - 2019 for wind, and 2018 - 2022 for solar. It is uncertain that these subsidies will be extended. For best sited projects, the levelized cost of electricity is now lower for wind and solar than for any other power source except efficiency. As unsubsidized wind and solar profitability increases, clean tax cuts will make increasingly good sense as a replacement policy for subsidies.

CTC developers should anticipate that, and take advantage of the opportunity presented by wind/solar subsidy market distortion right now. They should:

- **Apply CTC to all other clean solutions wherever feasible to correct the distortion.**
- **Use low barrier CTC solutions as demonstration projects to build a CTC track record.**
- **Start designing optimal CTC implementation, first for wind, then solar.**

4) Utilities... high barriers, or not? The measurement breakout group suggested that CTCs would be difficult to apply uniformly and effectively to utilities nationwide, on account of

regulatory differences from state to state. However, several impact group participants disagreed with this view. In post-charrette correspondence, Paul Walker explained:

By dramatically incenting the investors to put capital into Clean Tax Cuts assets, utilities would increase their spending on nuclear, wind, solar, geothermal, and in-stream hydro...

One has to assume that what [the measurement] group assessed was the difference between “competitive” jurisdictions and “regulated” states. 17 states and the District of Columbia allow customers to select their own utility; the other 33 states have monopoly utilities that serve all customers within their service area.

The latter group, the “regulated” states, set electric rates based on rate cases which assess the utilities costs and provide a rate that allows utilities the opportunity to recover those costs thru rates paid by customers. The formula for utility rate making is this:

Rate Base Assets x Rate of Return + Expenses = Required Revenues

Clean Tax Cuts would reduce the Expenses component of that formula, and public utility commissions would, in each rate case, pass the tax savings thru to customers.

In “competitive” jurisdictions, the public utility commission does not provide “Required Revenues” rates – utilities are on their own to earn their required revenues in the market. Clean Tax Cuts would reduce utilities’ costs and those savings would reduce rates in the market (thru competitive pressure), but the public utility commission would have no power to ensure that occurred, it would simply be a market function.

I, for one, do not think that would make it “hard to apply CTCs to utilities nationwide” – it would simply mean that public utility commissions in “competitive” states would not be able to ensure that all tax savings flowed thru to customers; instead, the market would shift and utilities providing power thru assets and services qualifying for Clean Tax Cuts would have lower costs and would use their price advantage to gain market share from utilities not so empowered.

So while the charrette ended with the idea, unchallenged, that utility regulatory differences posed a high barrier to CTC implementation, post-charrette discussion provided an opposite perspective. It may be that CTC applied to utilities through capital tax rate reduction would be highly impactful and easy to implement. But right now, utilities stay in the “mixed barriers and opportunities” class until the CTC working group resolves that question.

5) Nuclear power: Members of the CTC working group disagree about nuclear power impacts, business case, profitability and CTC applicability. Some believe preserving existing nuclear power capacity is absolutely critical to meeting 2°C climate targets, and believe CTC can help innovative entrepreneurs create a new generation of safer, cleaner, profitable nuclear reactors. Others disagree. They feel more cost effective and viable pathways to 2°C exist, and that the environmental and health risks posed by uranium mining, ground water contamination, reactor operation and long term radioactive waste storage are substantial, and call into questions the use of “clean” when applied to nuclear.

CTC is technologically neutral in general, and neutral toward nuclear power as well. Both sides make strong arguments. But CTC can be safely and neutrally applied to nuclear power because either there is a business case for nuclear (unsubsidized) or not. If not, and if there never likely will be, as many nuclear opponents argue, then CTC will have no benefit for nuclear. So if opponents are right, they have nothing to fear from CTC applied to nuclear. But if smaller, safer, modular nuclear reactors (or other new designs) become profitable, as nuclear advocates argue they will, then CTC will accelerate their development and make them safer and cleaner too. CTC's can reward best practices in mining and reactor design and operations - if these are profitable - and so would make the overall nuclear industry safer and cleaner than if supported by subsidies alone.

So if both nuclear advocates and opponents have confidence in their opposite predictions about future unsubsidized profitability, neither side has anything to fear from CTC applied to nuclear.

Clean tax cuts offer interesting potential benefits to both sides of the nuclear debate, and a "put your money where your mouth is," win-win path to compromise.

5) Post-charrette proposals: Several interesting proposals came up in post-charrette brainstorming discussions regarding tax reform. These ideas may be good or bad, and were not vetted by the charrette - and so fall in this mixed barriers and opportunities section - but are worth mentioning in case they have some value:

- **Clean Tax Range Cuts:** To get more bang for the buck from CTC, it might be useful to think of a clean tax cut as providing a range of tax rates for ordinary businesses and clean solutions. Heretofore, GRF has discussed that range as extending from existing tax rates downwards, cleaner project getting lower rates.

Another approach: The current top capital gains rate is 20%. A clean tax range cut might transform the top rate into range spanning from 5% for the cleanest carbon negative solutions, to 29% for the least clean investments. This would create a more powerful CTC effect, with the upper end of the range helping to finance the cleanest tax rates. Overall, it is a net tax cut. The average top capital gains rate would drop to 17%, which should have some conservative appeal, as would the built in opportunity for taxpayers to earn lower tax rates. The elimination of subsidies and other less efficient tax breaks would still be required to help finance this net cut, but the tax cut helps sell the tax reform. One big advantage of this approach would be that the larger tax differential should create a more powerful decarbonization effect.

- **Replace the income progressive tax code with a Clean Tax Code:** Many studies show that wealthy people have much larger carbon footprints than poor people, and also that everyone can take concrete steps to reduce their carbon footprint. So why not replace our income progressive tax code (which punishes good things like wealth creation) with a clean tax code that rewards energy and materials efficiency and innovation? Wealthy people would still pay more than poor folks, but their efforts at tax avoidance would have the nice side effect of cleaning up and perhaps saving the planet.

- **Keep fossil resources in the ground using CTC enhanced income and estate tax provisions for conservation easements and tax deduction carry forwards:** Many climate activists would love to find a way to incentivize keeping fossil fuel resources in the ground. Conservationists have already figured out some clever ways to incentivize conservation of natural resources using land trusts and conservation easements. Indeed, charitable tax deduction laws supporting conservation (another pre-existing application of CTC) have recently been expanded. See these links for current [income tax](#) and [estate tax conservation benefits](#). However, it is likely that such laws could go further at incentivizing conservation of fossil fuel resources, raising the value of conservation estate tax exclusions and income tax deductions and extending the carry forward period allowed, to make such fossil fuel conservation more attractive. Perhaps worth further study.



Steve Anderson, David Parham and Henk Rogers connect after the meeting. Henk, CEO of Blue Ion, was intrigued by the potential of Clean Tax Cuts to accelerate the development of energy storage solutions. David demonstrated how SASB's sustainability accounting standards and approaches could drive CTC implementation. Steve, a Montauk surfer, was fascinated that clean tax cuts design is inspired, in part, by insights drawn from surfing, sailing, aikido, hydro- and aerodynamics, Amory's plumbing, and other physical flow systems.

HIGH BARRIERS AND BEYOND THE SCOPE

The measurement group identified three areas where it would be difficult to apply CTC. In fact, these areas appear to be simply outside the scope of CTC as currently defined - focussed mainly on capital tax rate reduction. These areas include:

- **tax exempt organizations** (Obviously, a tax exempt organization cannot directly benefit from a tax rate cut. However, tax exempt organization would benefit indirectly from CTC cost reducing effects, like all consumers. Clean energy, technology, materials and efficiency would become cheaper for everyone.)
- **supply chain/life cycle analysis and**
- **import tariffs** (which together present complex measurement and international trade and diplomacy considerations which likely can't be easily addressed by domestic capital tax rate reduction alone).

These areas could however be considered at a later stage of CTC development, but would likely involve tangents beyond the core concept.

Tangents without high additional impact, by the way. That is so because CTC will already have an impact on these areas through different channels. For instance, as noted above, CTC reduces costs of clean solutions purchased by tax exempt organizations or anyone, the same way a carbon tax would make high emissions energy more expensive. Both fiscal policies would have a price effect, and that is how they affect everybody.

It should be noted that charitable tax exempt organizations prevail, in fact, as a pre-existing, highly successful example of the basic CTC concept: if you want more of something, tax it less. Indeed, many non-profits have a strong decarbonizing impact. GRF pioneers Clean Tax Cuts, which may yet have an enormous global decarbonizing impact. Both Sabin Center and RMI (indeed most CTC working group organizations) also each have distinct, high impact decarbonization strategies. All aided by tax reduction. So arguably CTC is already at work in the non-profit sector, just unrecognized as such.

Still, it may be a bit thick to expect the business-oriented CTC concept discussed herein, targeted at taxes on profits, to have an impact on organizations without taxes or profits.

CTC will affect imports through the channel of US capital taxes. Resellers of imports must pay taxes on their US profits. A decarbonizing import, say a Chinese solar panel, would have the identical benefit for US reseller's capital taxes as a domestically produced solar panel. So CTCs can have an impact on imports without resort to tariffs.

CTC can safely ignore the mind numbing complexity of detailed supply chain/life cycle analysis (part of Scope 3 indirect emissions) because CTC has a strong impact on scope 1 and 2 emissions (direct emissions and purchased power emissions respectively). It can affect scope 3 emissions because everyone's scope 3 emissions are someone else's scope 1 and 2 emissions. So if it deals effectively with scope 1 and 2 emissions, it has dealt with scope 3 emissions to a great extent.

It is worth noting that sustainability accounting protocols largely agree with this reasoning, and go even further to suggest that if we deal with just scope 1 emissions, then we have dealt with scope 2, because everyone's scope 2 is someone else's scope 1. The SASB CTC white paper in fact only recommend use of scope 1 emissions in setting tax rates. Supply chain/life cycle analysis is by no means critical to include in either CTC or sustainability accounting. In fact, it is an optional category in the WRI GHG accounting protocol for the simple reason that it is impossibly difficult to do accurately, as it would involve every corporation doing not just their own sustainability accounting, but that of every other supplier they buy from, and their suppliers, and their suppliers, and their suppliers, in infinite regression.

That said, it is worth considering obvious supply chain and life cycle issues when designing CTC implementation - and complementary policies to address those issues - so that CTC does not create perverse results.



Dieter von Lehsten and Sarah Hunt. Dieter, among others, was concerned CTC developers would face many complexities that would pose tough challenges. Sarah felt that the charrette was a success merely on the grounds that it provided a forum where policy experts from left, right and center, from organizations like NRDC, ALEC, R Street and RMI, could have a civil, productive, solution-focused conversation, exploring new ideas together.

AREAS FOR FURTHER STUDY

Charrette participant recommended these areas for further study:

- 1) **How to incentivize individuals and innovators without profits yet?** Some participants expressed some worries that CTC might actually stifle the innovation of small entrepreneurs because it would magnify the advantages of large companies. GRF finds this view implausible, based on the self-evident fact that American individual entrepreneurship and innovation boomed, and has continued to flourish, after the advent of the Reagan tax cuts, and the comparatively low capital tax rates the US has enjoyed since then. Those capital tax cuts clearly stimulated capital markets. Apple, Microsoft, Cisco and countless other small start ups were able to innovate, grow and go public in that tax environment, and countless others have followed their wake since then. No signs of stifled innovation.

That said, some CTC working group members felt this concern deserved attention. Jimmy Kemp offered the following thoughts:

“I wish you could expand the analysis of innovation and the "infant industries" (big literature for this, and pedigree including Hamilton) argument for pre-profitable clean tech investments. To drive [small innovators] into the control of large firms that can sustain losses, diversify their experimentation, and eventually be able to use the CTC, would be to stifle innovation, a body of literature would argue. So you might want to acknowledge the role of subsidies in innovation as needing more study. You could argue that the subsidy could be private rather than government, but you'd be safest to have the individual taxpayer CTC version, not just a corporate tax application (even if passed through to individual investor income), so a clean tech investment loss could offset ordinary income, like with capital gains.”

Exploring opportunity expanding individual income tax applications of CTC seems like a very good idea, as does understanding the proper role subsidies and public research in interaction with CTC. Whatever one thinks of the thesis that tax cuts may harm start ups.

- 2) **Conglomerates and spinoffs.** Some participants felt CTC impact might be adversely affected by the structure of large conglomerates and the ability to spin off high-emission divisions. Others felt that such spinoffs would indicate that CTCs were working, that high-emission investments had become less desirable, and so were being sold. The measurement group recommended the use of case studies to explore these questions.
- 3) **Mixed or contentious impacts (e.g. natural gas).** CTC will need to incorporate a mechanism to answer such questions on an ongoing basis, and verify the claims made on behalf of new technologies. It is possible that this issue has already been considered and resolved by other expert groups, so the inquiry should start there.
- 4) **Baseline performance vs. improved performance (additionality).** CTC developers will need to define baselines that trigger tax reduction, and decide whether baselines should move as industries improve, and whether companies should be rewarded for beating the baseline

performance, or only for beating their own performance. GRF believe baselines should move, and companies should be rewarded to the extent they beat the baseline.

During the plenary session, a related question was posed: Say a company, Clean Co., already gets an A+ for climate risk mitigation from the Carbon Disclosure Project. Why give them clean tax cuts if they are already doing their best and likely will not improve? Wouldn't this result in a revenue loss with no decarbonization reward?

The answer is: (a) There will be a decarbonization reward. By lowering the tax rates of Clean Co., the company will grow faster, and have a competitive advantage over less clean competitors. So by rewarding Clean Co., we grow decarbonization as we grow Clean Co. (b) Revenues may decline, but there should be no budget shortfall, because CTCs are designed to replace less efficient subsidies and tax breaks that do not help Clean Co. grow as fast. Properly designed, CTCs include a spending cut offset, plus growth, the combination of which should keep the budget in balance, while reducing taxes and spending.

5) Relationship to regulations (e.g. CAFÉ standards) and subsidies. CTC in general are designed to replace subsidies and regulations. However, some regulatory reporting, such as required for CAFE standards, may be very useful in providing metrics for CTC tax rate application. So data reporting may continue, but CTC will seek to reduce the regulatory burden by replacing punishments for inadequacy with rewards for excellence. With respect to subsidies, as indicated above, studies regarding their proper role in fostering innovation are in order.

6) How deal with land use patterns; agriculture; forestry. It may be that experts in land use, agriculture and forestry have suggestions for us.

7) How to best implement CTC with respect to promising sectors and policy applications identified herein. That, in a nutshell, is the most important next step the CTC working group will take.

NEXT STEPS

Within the last year, and especially ever since the first public presentation of the Clean Tax Cuts concept last June, CTC has become, emphatically, an open source public policy development project. While rooted in explicitly conservative public policy concepts, CTC has been shaped by a diverse group of non-partisan, bipartisan and transpartisan experts, entrepreneurs, financiers and capitalists. That approach, so in tune with the basic CTC approach of bootstrapping positive entrepreneurial innovation wherever it can be found, will continue.

To that end, CTC working group members will consult with each other and GRF to plan how best to address the promising areas identified by the charrette for further study and development. Participants and readers are welcome to offer comment on this report. Anyone, or any group or organization wishing to offer suggestions or commentary, or participate in the CTC working group, or Clean Capitalism Challenge, for the development of the Clean Tax Cuts concept is most welcome to contact Rod Richardson, President, Grace Richardson Fund, at rrr.grf@gmail.com.

POST-CHARRETTE GATHERING



Folks continued the discussions after the event within the meeting room and later on at a cocktail party hosted by the Grace Richardson Fund at Faculty House. Top: Chip Comins (standing) relays findings from the political breakout group, while Prof. Dave Wilson (seated) reviews the origins of the Carbon Tax with Catrina Rorke and Henk Rogers. Bottom: Meeting facilitator Michael Kinsley and Clay Stranger of RMI spoke with Prof. Michael Gerrard of Columbia, who was instrumental in bringing the charrette to Columbia University. Amory Lovins, Michael Kinsley, David Koplow and Steve Nadel exchange ideas.

Appendix 1: Post-Charrette Correspondence

(A) Post-Charrette Correspondence from Travis Bradford:

From: Travis Bradford <tbradford@prometheus.org>

Subject: Re: Useful discussion

Date: October 12, 2016 at 9:47:52 AM EDT

To: Rod Richardson <rrr.grf@gmail.com>

Rod –

Trying to get this to you quickly, so apologies for any errors or omissions.

Optimizing Clean Tax Cuts –

In thinking about the most effective way to use tax reduction to target clean energy (or resource) deployment, it seems definitional that the goal is to encourage the most capital investment in targeted technologies. Doing so is most likely done at one of three levels of taxation around clean investment – 1) at the corporate level of firms deploying these assets, 2) at the project level for firms developing these projects, or 3) for investors who provide the financial capital for these capital intensive projects. The most direct mechanism for achieving the desired outcome is the third. Corporate tax abatement is too diffuse and is likely to achieve perverse outcomes of investment strategies by firms, depending on exactly how the tax cut is structured. Project level tax abatement is not effective because of the low level of project level taxes paid for these types of assets until the heavy depreciation burden and interest expense have been burned through at the project level. Incentivizing capital providers through strategies similar to municipal bond tax abatement for interest and dividend income from approved investments will direct capital specifically to those assets and will be instantly realizable by the investors.

Plus, many design options exist – partial tax abatement, tax abatement based on the realization of the project performance, double abatement in the form of carbon capture and sequestration, declining abatement potential over time to incentivize accelerated investment. It is super flexible. Also, it probably just simply corrects for existing distortions in the tax code through MLPs where certain conventional energy assets have pass-through status and only one level of taxation. This levels the playing field somewhat for clean assets.

A hidden advantage of targeting investors –

Here is the cool part of this - a significant amount of the tax abatement that occurs will go to driving down the imputed interest rates of interest that these projects and their assets bear – again similar to municipal bonds that have much lower cost of capital than equivalently risky private-sector borrowers. Given that the set of technologies that are being financed are largely capital-based, with very little fuel or O&M costs in their total cost structure, this has a major impact on reducing the cost of delivering the output from the asset – somewhere between 15 and 30%, depending on specific circumstances. A clean energy solution would see its levelized cost of electricity fall by this amount.

I have included a related chart from my forthcoming textbook on this to see the effect. Simply, reducing project WACC by a modest amount, the levelized cost of delivering the output of that asset falls. This means that the investors are not only getting tax abatement, but they are creating the conditions that drive down the cost of clean solutions directly. This WACC reduction will take a technology that may be a 25% too expensive and make it cost effective, or one that is already cost-effective would become 25% cheaper than other solutions. Cheaper solutions have the effect of creating substantially larger potential markets for these technologies opening up many more options for cost effective deployment – simply, clean tax cuts at the investor level increase the supply of clean solution investment opportunities and the demand for them simultaneously.

Original WACC:	Rate Reduction			
	3.5%	3.0%	3.5%	2.0%
9.0%	-26.8%	-23.2%	-19.5%	-15.7%
8.0%	-28.0%	-24.3%	-20.4%	-16.5%
7.0%	-29.3%	-25.4%	-21.4%	-17.3%
6.0%	-30.6%	-26.6%	-22.4%	-18.2%

Assumptions: Amortized capital costs only; No O&M or fuel costs; 25 year lifetime.

Hope that helps. I am sorry, but the agriculture point seems to have escaped me. Perhaps Paul could refresh my thinking of the context of the conversation, or we save that one for the sequel.

Best wishes and many thanks.

TB

TRAVIS BRADFORD

Faculty, Columbia University

Director, Energy and Environment Concentration, SIPA

[420 W. 118th Street](#) (at Amsterdam), #804

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(B) Post-Charrette Correspondence with David Parham:

From: David Parham <david.parham@sasb.org>

Subject: Transportation Sector Metrics

Date: October 6, 2016 at 1:46:30 PM EDT

To: Rod Richardson <rrr.grf@gmail.com>

Hi Rod,

I wanted to follow up to our phone call earlier this week to provide you with some information regarding the transportation sector.

I met with our Transportation Sector Analyst and we completed some research into types of metrics, current legislative frameworks, and the current status of disclosure. This information has been presented below.

The SASB standard for the Automobiles industry (Transportation Sector) includes the following metric with respect to fuel efficiency:

Accounting Metric	Category	Unit	Code
Sales-weighted average passenger fleet fuel economy, consumption, or emissions, by region	Quantitative	Mpg, L/km, gCO ₂ /km, km/L	TR0101-09

For vehicles sold in the United States, the Corporate Average Fuel Economy (CAFE) standard is specifically referenced, with disclosure recommended for domestic passenger cars, imported passenger cars, and light trucks.

SASB research has found that this metric is likely to be material for registrants in the Automotive industry and therefore recommends disclosure of this topic in industry 10-K or 20-F filings; however, a review of industry disclosures has found that the current level of disclosure for this topic consists primarily boilerplate or company-tailored narratives (not quantitative).

Although not reported in company filings, this data is available through the [NHTSA CAFE Public Information Center](#). For each Manufacturer and Model Year, fleet data can be observed for passenger cars and light trucks with respect to fuel efficiency performance and the CAFE standard requirement. As this data must already be reported by Automobile manufacturers per the CAFE standard, there is no marginal cost associated with generating this data for use in other frameworks, such as CTC (assuming the CAFE methodology is used).

The CAFE standard subjects manufacturers to a “civil penalty of \$5.50 for each tenth of a mile below the required fuel efficiency level for each vehicle sold in the model year (49 U.S.C. 32912(b)).” To date, approximately \$873.7 million have been collected (since 1983). Enforcement data is available via the NHSTA website as well, both in a [report](#) and in a [searchable database](#).

With respect to CTC, the existing CAFE framework for the assessment of fines could serve as a starting point. Just as for the current CAFE framework, the following would general outline would likely be required:

1. A method to measure fuel efficiency performance (example: existing formula used by CAFE standard)
2. A method to establish a baseline or target (examples: existing CAFE standard targets, Science Based Targets SDA, or other)
3. A framework to assign tax cuts based on performance (absolute or relative) measured against the baseline or target

As per our discussion during the charrette, due to existing regulatory requirements this sector appears to have existing well-defined metrics that may inform the CTC concept.

Also wanted to provide a general SASB-update – we are currently kicking off our consultation efforts on our standards, which is our current priority and will focus heavily on investor/issuer engagement as we move towards codification of our standards. Unfortunately this may mean I am a bit slower to respond than usual, and so wanted to give you a head's up and apologize in advance if this is the case.

Thanks,

David Parham

Sector Analyst – Non-Renewable Resources
Sustainability Accounting Standards Board
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From: Rod Richardson <rrr.grf@gmail.com>
Subject: Re: Transportation Sector Metrics
Date: October 6, 2016 at 2:31:56 PM EDT
To: David Parham <david.parham@sasb.org>

Thank you David. That's very helpful. I'll take a closer look at the link. With your permission I'll share that with the CTC working group.
A couple of quick questions.:

- 1) how are electric vehicles treated under the CAFE standards?
- 2) did you notice, are there any auto or truck manufacturers that regularly exceed the CAFE standards and what manufactures would be in that group?
- 3) did you have any thoughts as to how the rates should be set relative to the CAFE standards? What tax reduction be warranted for meeting the standard or exceeding it? Should it be based on each vehicle or is there an easy metric regarding sleep averages that can be used?

Thank you very much David!

When you have time I'd be very interested to have you take a similar look at the other areas we discussed: energy efficiency in operations, Energy efficiency products, clean energy and clean tech other than Wind and solar, agriculture.

Your input has been a huge help, and really demonstrates the value that SASB brings to any discussion of decarbonization metrics.

All the best,

Rod

Rod Richardson
President
The Grace Richardson Fund
New Free Market Solutions for 21st C. Challenges

From: David Parham <david.parham@sasb.org>
Subject: RE: Transportation Sector Metrics
Date: October 6, 2016 at 4:29:33 PM EDT
To: Rod Richardson <rrr.grf@gmail.com>

Hi Rod,

Thanks! To answer your questions:

- Electric vehicles – these count for 0 with respect to fuel consumption, and are further rewarded with a multiplier:
 - 3.5 for plug-in hybrid electric vehicles
 - 4.5 for all-electric vehicles
 - 5.5 for fuel cell vehicles

Therefore, the more electric vehicles produced, the lower the fleet fuel consumption per unit distance traveled. This data can be found in the EPA [final rule](#).

- It appears that most of the manufacturers are meeting the standard requirement (based on there being few fines assessed), but I did not have a chance to look at their relative performance in detail yet.
- Data is available for each car model as well at [this website](#). Need to do some thinking about the pros/cons of the various options, i.e.:
 - Manufacturer fleet-based targets versus model-based targets.
 - Baseline based on a goal-based standard (eg CAFE, SDA, or other) versus an industry performance-based standard (for example, US-wide fleet average for a given year).There are advantages/disadvantages of each, and would need to think through to make sure that the desired result will be efficiently/effectively achieved by the incentive structure.

Thanks,

David Parham

Sector Analyst – Non-Renewable Resources

Sustainability Accounting Standards Board



Accounting for a
sustainable future™

(C) Post-Charrette Correspondence from Justin Gundlach:

From: Justin M Gundlach <jmg2308@columbia.edu>

Subject: Re: Agriculture

Date: September 27, 2016 at 10:25:56 AM EDT

To: Rod Richardson <rrr.grf@gmail.com>

Rod: Thanks for your email. I was very glad for the chance to attend last Friday, to hear from the assembled luminaries, and to think aloud about what you've proposed.

My suggestion about possibly focusing the CTC on agriculture is the result of three premises:

- unlike the energy, transportation, and building sectors, the agriculture sector has yet to standardize processes for inventorying and reducing GHG emissions -- which means that there is almost certainly a lot that can be done relatively cheaply to reduce ag GHG emissions;
- agricultural policy tends to operate through positive incentives rather than negative ones (negative ones tend not to make it past political veto points); and
- concentrated animal feeding operations (CAFOs) have been defined legally for purposes of compliance with the Clean Air Act and Clean Water Act, which means that their owner/operators already have various technical and administrative mechanisms in place to capture and report information about pollution. CAFOs are also industrial operations whose parameters, inputs, and outputs, are already analyzed carefully for various purposes unrelated to pollution control.

Taken together, these points suggest to me that if you give CAFOs even modest incentives to emit less, they'll quickly find ways to emit less.

I'm no expert on agriculture operations or policy. Most of what I know I've learned through Clean Water Act law suits. My work has tended to focus on energy, electricity, and land use law in relation to climate adaptation. So my suggestion that you explore applications of the CTC to CAFOs is the result of general rather than expert knowledge. On the other hand, for the reasons listed above it seems to me like it might be a promising avenue.

Justin

(D) Post-Charrette Correspondence from Ken Coulson:

From: Future Bright LLC <ken@futurebrightllc.com>
Subject: Re: CTC Charrette Report - DRAFT FOR PARTICIPANT REVIEW -
Date: October 26, 2016 at 9:44:27 AM EDT
To: Rod Richardson <rrr.grf@gmail.com>

Hi Rod,

Thank you again for including me in the CTC Charette. I found it informative and thoughtful, with so many diverse backgrounds coming together to work towards a common goal: low-carbon asset growth.

I wanted to provide two items for follow up to the group, that could be included in the draft if you see fit. Both were mentioned in the broader discussion and in the breakout group I participated in.

The first relates to agriculture. I present an article, "Grass Fed Fish", published last year and written by a practitioner I am working with to develop clean food projects. The article discusses the potential positive impacts in aquaculture and beyond of switching to grass-based feeds model for protein production. One quote from the article below references the application to our discussion:

"Some claim that a large percentage of carbon emissions causing global warming has come from our lost soils, not just burning of oil, but soil volatilizing back to gaseous carbon that was once sequestered in our deep soils. Even more dramatic is the possibility that converting a large portion of our grain base to grass could recapture this carbon and reduce annual carbon emissions by 25% or more."

The second was a suggestion that a good proxy to understanding the bi-partisan potential to CTC is to understand views on the *MLP Parity Act*, which seeks technology-neutrality for an investment structure used to promote energy infrastructure growth. As discussed, with over \$300B in MLP market cap, this structure is important to capital markets, but could also be used as a point of diversification and a potential testing ground, if all technologies were included. One might argue that today, MLP encourages the opposite to what CTC's stated goals are and thus, MLP Parity would be a good intermediary, albeit with a smaller scope. I've attached the latest draft of the bill from my files. Another source of value could be to equate the value of MLP to current beneficiaries to the value of renewable subsidies. At the very least, it serves as additional information on where the structural impediments may lie to inform the design process.

I think the focus on agriculture, in particular, is an important task given under representation in the GHG dialogue and in solution-oriented investment flows.

Best Regards,

Ken Coulson
Future Bright, a Sustainability holding co.
(203) 918-2871
ken@futurebrightllc.com
www.futurebrightllc.com

[pdf documents on grass fed fish and MLP Parity can be obtained from Ken Coulson directly]

(D) Post-Charrette Commentary from Dillon Ripley Lanius:

A number of participants expressed interest in the unusual sources of ideas that have shaped the clean tax cuts concept. Which, all together, go well beyond the synthesis of ideas from classical, supply-side, Pigouvian, and neo-Keynesian economics, or from Aristotelean ethics and classical liberalism. Clean tax cuts design is also inspired, in part, by insights drawn from physical flow systems and art forms, and the physics behind such nearly-scientific arts as surfing, sailing, aikido, hydro- and aerodynamics, Amory's plumbing, glass sculpting, and other such technical arts.

These physical systems offer numerous visceral analogies that can help laymen grasp, almost "feel," the economic forces guiding or blocking capital flows, and grasp the basic force behind clean tax cuts: that it is easier, more efficient and ultimately more powerful to go with the flow... to harness and boost a positive capital flow... than to block a negative capital flow.

To this point, Dillon Ripley Lanius, Co-Chair of the Nexus Working Group on Climate Change, offered the following post-charrette commentary:

"Clean tax cuts embodies the idea of rewarding the good vs. punishing the bad. This principle is recognized by educators and developmental psychologist as the best approach for teaching and learning. However when I first heard Rod explain clean tax cuts to me I couldn't conceptualize this advantage to climate policy because I had grown up in an environmentalist culture that punished polluters. Rod was patient with me and communicated the concept of rewarding the good in climate policy using metaphors of riding with waves, tides, wind and sails. As I reflected on my own physical experiences of this underlying principle something within me shifted. I had an epiphany! I recognized the conflict, fallacies, and inefficiencies I had kept as underlying assumptions in my expectations of climate policy and the incredible breakthrough clean tax cuts creates.

"I honestly experienced a shift in my body during our conversation about clean tax cuts vs. carbon tax....remarkable experience."



The Flow Sculptures of Rod Richardson... created by letting the glass flow in new directions.

Appendix 2: CTC Charrette Participants

NAME, ORGANIZATION	EMAIL
Amory Lovins, Rocky Mountain Institute (RMI), Co-founder & Chief Scientist	ablovins@rmi.org
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Sarah Hunt, American Legislative Exchange Council (ALEC)	shunt@alec.org
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Sally Jewell Coxe, Bonobo Conservation Initiative	scoxe@bonobo.org
Elizabeth Halliday, Grace Richardson Fund (GRF)	hallidayny@gmail.com

Appendix 3: Green Bond Principles



Green Bond Principles, 2016

Voluntary Process Guidelines for Issuing Green Bonds

16 June 2016

INTRODUCTION

Green Bonds raise funds for new and existing projects with environmentally sustainable benefits. The Green Bond Principles (GBP) are voluntary process guidelines that recommend transparency and disclosure, and promote integrity in the development of the Green Bond market. They are intended for broad use by the variety of actors participating in the market and are designed to provide the information needed to increase capital allocation to environmentally sustainable purposes without any single arbiter.

This edition of the GBP benefits from the input of the 2015 summer consultation of GBP Members and Observers, as well as of the subsequent working groups created by the GBP Executive Committee to reflect on the key themes that surfaced from the consultation. It also aims to reflect ongoing feedback from the wider Green Bond stakeholder community and to take into account recent market developments.

The 2016 update continues to be framed by the same four core components (Use of Proceeds, Process for Project Evaluation and Selection, Management of Proceeds and Reporting). A particular effort has been made this year to recommend best practice on information sharing and external reviews including through proposed templates. This is designed to help investors, and the market generally, to establish the alignment of issuances with the GBP. Project eligibility is discussed in the Green Project categories under the Use of Proceeds section and has been expanded to include more details and reference to other external resources. Additional detail has also been included on reporting guidelines.

Finally, this update of the GBP acknowledges the application of the “use of proceeds” bond concept to themes beyond the environment, such as bonds financing projects with social objectives, or with a combination of social and environmental objectives. A number of such Social or Sustainability Bond transactions share common key features with Green Bonds. Guidance for Issuers of Social Bonds has therefore been developed to confirm the relevance of the GBP in this context and facilitate their application to provide transparency and disclosure to this emerging segment. A copy of this document is available at www.icmagroup.org/socialbonds.org.

GREEN BOND DEFINITION

Green Bonds are any type of bond instrument where the proceeds will be exclusively applied to finance or re-finance in part or in full new and/or existing eligible Green Projects (see section 1 Use of Proceeds) and which are aligned with the four core components of the GBP.

Different types of Green Bonds exist in the market. These are described in Appendix I. It is important to note that Green Bonds should not be considered fungible with bonds that are not aligned with the four core components of the GBP.

GREEN BOND PRINCIPLES

The Green Bond Principles (GBP) are voluntary process guidelines that recommend transparency and disclosure and promote integrity in the development of the Green Bond market by clarifying the approach for issuance of a Green Bond. The GBP are intended for broad use by the market: they provide issuers with guidance on the key components involved in launching a credible Green Bond; they aid investors by promoting availability of information necessary to evaluate the environmental impact of their Green Bond investments; and they assist underwriters by moving the market towards expected disclosures which will facilitate transactions.

The GBP recommend a clear process and disclosure for issuers, which investors, banks, investment banks, underwriters, placement agents and others may use to understand the characteristics of any given Green Bond. The GBP emphasize the required transparency, accuracy and integrity of information that will be disclosed and reported by issuers to stakeholders.

The GBP have four core components:

1. Use of Proceeds
2. Process for Project Evaluation and Selection
3. Management of Proceeds
4. Reporting

1. Use of Proceeds

The cornerstone of a Green Bond is the utilization of the proceeds of the bond for Green Projects which should be appropriately described in the legal documentation for the security. All designated Green Project categories should provide clear environmental benefits, which will be assessed and, where feasible, quantified by the issuer.

In the event that all or a proportion of the proceeds are or may be used for refinancing, it is recommended that issuers provide an estimate of the share of financing vs. re-financing, and where appropriate, also clarify which investments or project portfolios may be refinanced.

The GBP explicitly recognize several broad categories of eligibility for Green Projects aiming to address key areas of concern such as climate change, natural resources depletion, loss of biodiversity and/or pollution control. The list is intended to be indicative and capture the most commonly used types of projects supported or expected to be supported by the Green Bond market. These categories, listed in no specific order, include, but are not limited to:

- renewable energy (including production, transmission, appliances and products);
- energy efficiency (such as in new and refurbished buildings, energy storage, district heating, smart grids, appliances and products);
- pollution prevention and control (including waste water treatment, greenhouse gas control, soil remediation, recycling and waste to energy, value added products from waste and remanufacturing, and associated environmental monitoring analysis);
- sustainable management of living natural resources (including sustainable agriculture, fishery, aquaculture, forestry and climate smart farm inputs such as biological crop protection or drip-irrigation);
- terrestrial and aquatic biodiversity conservation, (including the protection of coastal, marine and watershed environments);
- clean transportation (such as electric, hybrid, public, rail, non-motorized, multi-modal transportation, infrastructure for clean energy vehicles and reduction of harmful emissions);
- sustainable water management (including sustainable infrastructure for clean and/or drinking water, sustainable urban drainage systems and river training and other forms of flooding mitigation);
- climate change adaptation (including information support systems, such as climate observation and early warning systems);
- eco-efficient products, production technologies and processes (such as development and introduction of environmentally friendlier, eco labelled or certified products, resource efficient packaging and distribution).

While the GBP's purpose is not to take a position on which green technologies, standards, claims and declarations are optimal for environmentally sustainable benefits, issuers and other stakeholders can refer to examples through links listed on the GBP webpages at www.icmagroup.org/greenbonds. Furthermore, there are many institutions that provide independent analysis, advice and guidance on the quality of different green solutions and environmental practices. Definitions of green and green projects may also vary depending on sector and geography.

2. Process for Project Evaluation and Selection

The issuer of a Green Bond should outline:

- a process to determine how the projects fit within the eligible Green Projects categories identified above;
- the related eligibility criteria; and
- the environmental sustainability objectives.

The GBP encourage a high level of transparency and recommend that an issuer's process for project evaluation and selection be supplemented by an external review (see External Review section).

In addition to information disclosed by an issuer on its Green Bond process, criteria and external reviews, Green Bond investors may also take into consideration the quality of the issuer's overall profile and performance regarding environmental sustainability.

3. Management of Proceeds

The net proceeds of Green Bonds should be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer in an appropriate manner and attested to by a formal internal process linked to the issuer's lending and investment operations for Green Projects. So long as the Green Bonds are outstanding, the balance of the tracked proceeds should be periodically adjusted to match allocations to eligible Green Projects made during that period. The issuer should make known to investors the intended types of temporary placement for the balance of unallocated proceeds.

The GBP encourage a high level of transparency and recommend that an issuer's management of proceeds be supplemented by the use of an auditor, or other third party, to verify the internal tracking method and the allocation of funds from the Green Bond proceeds (see External Review section).

4. Reporting

Issuers should make, and keep, readily available up to date information on the use of proceeds to be renewed annually until full allocation, and as necessary thereafter in the event of new developments. This should include a list of the projects to which Green Bond proceeds have been allocated, as well as a brief description of the projects and the amounts allocated, and their expected impact. Where confidentiality agreements, competitive considerations, or a large number of underlying projects limit the amount of detail that can be made available, the GBP recommend that information is presented in generic terms or on an aggregated portfolio basis (e.g. percentage allocated to certain project categories).

Transparency is of particular value in communicating the expected impact of projects. The GBP recommend the use of qualitative performance indicators and, where feasible,

quantitative performance measures (e.g. energy capacity, electricity generation, greenhouse gas emissions reduced / avoided, number of people provided with access to clean power, reduction in the number of cars required, etc.) with the key underlying methodology and / or assumptions used in the quantitative determination. Issuers with the ability to monitor achieved impacts are encouraged to include those in their regular reporting.

Leading International Financial Institutions have developed a reference framework for impact reporting (“Working towards a harmonized framework for Green Bond impact reporting” available at www.icmagroup.org/greenbonds) that outlines core principles and recommendations and puts forward core indicators for two sectors: energy efficiency and renewable energy. The framework includes templates for impact reporting at a project and portfolio level that other issuers can adapt to their own circumstances. The GBP welcome this initiative, and encourage further initiatives, to help establish additional references for impact reporting that others can adopt and/or adapt to their needs.

The use of a summary reflecting the main characteristics of a Green Bond or a Green Bond programme, and illustrating its key features in alignment with the four core components of the GBP may help inform market participants. To that end, a template can be found on www.icmagroup.org/greenbonds which once completed can be made available online for market information (see section on GBP Resource Centre below).

EXTERNAL REVIEW

It is recommended that issuers use an external review to confirm the alignment of their Green Bonds with the key features of the GBP as defined above. There are a variety of ways for issuers to obtain outside input to the formulation of their Green Bond process and there are several levels and types of review that can be provided to the market. Such guidance and external reviews might include:

- 1) **Consultant Review:** An issuer can seek advice from consultants and/or institutions with recognized expertise in environmental sustainability or other aspects of the issuance of a Green Bond, such as the establishment/review of an issuer’s Green Bond framework. “Second opinions” may fall into this category.
- 2) **Verification:** An issuer can have its Green Bond, associated Green Bond framework, or underlying assets independently verified by qualified parties, such as auditors. In contrast to certification, verification may focus on alignment with internal standards or claims made by the issuer. Evaluation of the environmentally sustainable features of underlying assets may be termed verification and may reference external criteria.
- 3) **Certification:** An issuer can have its Green Bond or associated Green Bond framework or Use of Proceeds certified against an external green assessment standard. An assessment standard defines criteria, and alignment with such

criteria is tested by qualified third parties / certifiers.

- 4) Rating: An issuer can have its Green Bond or associated Green Bond framework rated by qualified third parties, such as specialised research providers or rating agencies. Green Bond ratings are separate from an issuer's ESG rating as they typically apply to individual securities or Green Bond frameworks / programmes.

An external review may be partial, covering only certain aspects of an issuer's green bond or associated Green Bond framework or full, assessing alignment with all four core components of the GBP.

The GBP recommend public disclosure of external reviews, or at least an executive summary, for example by using the template available at www.icmagroup.org/greenbonds which once completed can be made available online for market information (see section on GBP Resource Centre below). The GBP encourage external review providers in any case to disclose their credentials and relevant expertise, and communicate clearly the scope of the review conducted.

The GBP take into account that the timing of an external review may depend on the nature of assets financed (new projects or refinancing of existing assets) and publication of reviews can be constrained by business confidentiality requirements.

GBP Resource Centre

Recommended templates and other GBP resources are available at the GBP Resource Centre at www.icmagroup.org/greenbonds. Completed templates can be made available online for market information at the GBP Resource Centre by following the instructions at www.icmagroup.org/greenbonds.

DISCLAIMER

The Green Bond Principles are voluntary process guidelines that neither constitute an offer to purchase or sell securities nor constitute specific advice of whatever form (tax, legal, environmental, accounting or regulatory) in respect of Green Bonds or any other securities. The Green Bond Principles do not create any rights in, or liability to, any person, public or private. Issuers adopt and implement the Green Bond Principles voluntarily and independently, without reliance on or recourse to the Green Bond Principles, and are solely responsible for the decision to issue Green Bonds. Underwriters of Green Bonds are not responsible if issuers do not comply with their commitments to Green Bonds and the use of the resulting net proceeds. If there is a conflict between any applicable laws, statutes and regulations and the guidelines set forth in the Green Bond Principles, the relevant local laws, statutes and regulations shall prevail.

APPENDIX I

TYPES OF GREEN BONDS

There are currently four types of Green Bonds (additional types may emerge as the market develops and these will be incorporated in annual GBP updates):

- **Green Use of Proceeds Bond:** a standard recourse-to-the-issuer debt obligation for which the proceeds shall be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer and attested to by a formal internal process that will be linked to the issuer's lending and investment operations for eligible Green Projects. It is recommended that the issuer make known to investors the intended types of temporary placement for the balance of unallocated proceeds.
- **Green Use of Proceeds Revenue Bond:** a non-recourse-to-the-issuer debt obligation in which the credit exposure in the bond is to the pledged cash flows of the revenue streams, fees, taxes etc., and the use of proceeds of the bond goes to related or unrelated Green Project(s). The proceeds shall be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer and attested to by a formal internal process that will be linked to the issuer's lending and investment operations for eligible Green Projects. Pending such investment or allocation, it is recommended that the issuer make known to investors the intended types of temporary placement for the balance of unallocated proceeds.
- **Green Use of Proceeds Project Bond:** a project bond for a single or multiple Green Project(s) for which the investor has direct exposure to the risk of the project(s) with or without potential recourse to the issuer.
- **Green Use of Proceeds Securitized Bond:** a bond collateralized by one or more specific Green Project(s), including but not limited to covered bonds, ABS, MBS, and other structures. The first source of repayment is generally the cash flows of the assets. This type of bond covers, for example, asset-backed securitizations of rooftop solar PV and/or energy efficiency assets.

Note:

It is also recognized that there is a market of environmental, climate or otherwise themed bonds, in some cases referred to as "pure play", issued by organisations that are mainly or entirely involved in environmentally sustainable activities, but that do not follow the four core components of the GBP. In such cases, investors will need to be informed accordingly and care should be taken to not imply GBP features by a Green Bond reference. These organisations are encouraged to adopt where possible the relevant best practice of the GBP (e.g. for reporting) for such existing environmental, climate or otherwise themed bonds, and to align future issues with the GBP.

Appendix 4: SASB CTC White Paper

SASB Overview for Clean Tax Cut Concept

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Sustainability Accounting Standards Board – Overview

Who We Are

SASB was founded in 2011 as an independent 501(c)(3) standards-setting organization in order to advance research conducted at the Initiative for Responsible Investment (IRI) in the Kennedy School of Government at Harvard University.

Our Mission

SASB's mission is to develop and disseminate sustainability accounting standards that help public corporations disclose material, decision-useful information to investors. That mission is accomplished through a rigorous process that includes evidence-based research and broad, balanced stakeholder participation.

How We're Different

- SASB standards are cost-effective, identifying the minimum set of disclosure topics likely to constitute **material** information for companies in an industry. On average, there are five topics and 13 metrics per industry included in the standards. Whenever possible, SASB references metrics already in use by an industry.
- SASB standards are **decision-useful** because they provide investors with material, comparable, industry-specific, and reliable data that supports investment decisions, including understanding and pricing risk, and informs typical investment activities such as portfolio construction, security selection, fundamental analysis, and valuation.
- SASB standards are the **only sustainability standards** developed in accordance with the definition of "materiality" defined by federal securities laws.
- SASB standards are the only sustainability standards available for all 79 industries of the economy. Sustainability issues are likely not material for all companies; when they are material, they manifest in unique ways and thus require industry-specific metrics. An industry lens keeps sustainability disclosure **cost-effective** for companies and decision-useful for investors.

Additional Information

For additional information, please refer to SASB's website, www.sasb.org.

SASB Metrics and the Clean Tax Cut Concept

SASB takes a systematic approach to its standard-setting activities to ensure that its standards identify industry-specific sustainability factors that are likely to have material impacts, while also providing disclosure guidance that is cost-effective for issuers and decision-useful for investors. To achieve these objectives, SASB standards are:

1. Evidence-Based

The SASB takes an evidence-based approach to assess the likelihood of material impacts from sustainability topics. This approach considers evidence of interest to investors and evidence of financial impact, the two principal types of evidence that the SEC has used as a basis for rulemaking related to disclosures. In analyzing sustainability topics, the SASB looks for the presence of both types of evidence, identifying topics that might be of interest to the reasonable investor and assessing their potential for financial impact.

2. Market-Informed

Although evidence-based research provides a foundation for the SASB's standard-setting process, the outcomes are shaped in large part by feedback from participants in the capital markets—i.e., corporate issuers and mainstream investors. The SASB actively solicits input and carefully weighs all stakeholder perspectives in considering which aspects of a sustainability topic warrant standardized disclosure and in determining how to frame, describe, and measure those aspects for the purposes of standardization. However, although the SASB considers the views of all stakeholders, its determinations are guided by its core objectives to provide the users and providers of financial capital with material, decision-useful, cost-effective disclosures.

3. Industry-Specific

Analyzing the materiality of sustainability information requires an understanding of the specific impact of business on society and the environment, as well as the impact of sustainability challenges on business. Companies operating in a specific industry are more likely than companies in disparate industries to have similar business models and use resources in similar ways. Therefore they are likely to have similar sustainability risks and opportunities. The SASB develops sustainability accounting standards at the industry level, focusing on issues that are closely tied to resource use, business models, and other factors at play in the industry. As a result, financial analysts, who also evaluate corporate performance within an industry context, can easily integrate and assess material sustainability factors alongside financial fundamentals.

The Clean Tax Cut Concept has identified a need to “measure outcomes conveniently, fairly, and transparently, preferably by applying existing well-established metrics” to support the quantification of GHG reduction emissions (or other criteria, where appropriate, such as energy efficiency) to enable the correlation of decarbonization (or efficiency) to tax rate cuts.

Per the methodology described above, SASB has identified industry-specific metrics which may provide relevant data to the Clean Tax Cut concept.

GHG Emissions

SASB has identified GHG emissions as likely to be material for 23 of the 79 industries for which Sustainability Accounting Standards were developed. To measure company performance with respect to this disclosure topic, SASB developed the following industry-specific accounting metrics:

Sector	Industry	Sustainability Accounting Metric(s)
Technology & Communications	Semiconductors	<ul style="list-style-type: none"> • TC0201-01: Gross global Scope 1 emissions and amount of total emissions from perfluorocompounds (PFCs) • TC0201-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, including emissions reduction targets, and an analysis of performance against those targets
Non-Renewable Resources	Oil and Gas – Exploration and Production	<ul style="list-style-type: none"> • NR0101-01: Gross global Scope 1 emissions, percentage covered under a regulatory program, percentage by hydrocarbon resource • NR0101-02: Amount of gross global Scope 1 emissions from: (1) combustion, (2) flared hydrocarbons, (3) process emissions, (4) directly vented releases, and (5) fugitive emissions/leaks • NR0101-03: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets
	Oil and Gas – Midstream	<ul style="list-style-type: none"> • NR0102-01: Gross global Scope 1 emissions, percentage covered under a regulatory program • NR0102-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets
	Oil and Gas – Refining and Marketing	<ul style="list-style-type: none"> • NR0102-01: Gross global Scope 1 emissions, percentage covered under a regulatory program • NR0102-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets
	Coal Operations	<ul style="list-style-type: none"> • NR0102-01: Gross global Scope 1 emissions, percentage covered under a regulatory program • NR0102-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets
	Iron and Steel Producers	<ul style="list-style-type: none"> • NR0201-01: Gross global Scope 1 emissions, percentage covered under a regulatory program • NR0201-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets

	Metals and Mining	<ul style="list-style-type: none"> • NR0302-01: Gross global Scope 1 emissions, percentage covered under a regulatory program • NR0302-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets
	Construction Materials	<ul style="list-style-type: none"> • NR0401-01: Gross global Scope 1 emissions, percentage covered under a regulatory program • NR0401-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets
Transportation	Airlines	<ul style="list-style-type: none"> • NR0401-01: Gross global Scope 1 emissions, percentage covered under a regulatory program • NR0401-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets
	Air Freight & Logistics	<ul style="list-style-type: none"> • TR0202-01: Gross global Scope 1 emissions • TR0202-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets
	Marine Transportation	<ul style="list-style-type: none"> • TR0202-01: Gross global Scope 1 emissions • TR0202-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets
	Rail Transportation	<ul style="list-style-type: none"> • TR0401-01: Gross global Scope 1 emissions • TR0401-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets
	Road Transportation	<ul style="list-style-type: none"> • TR0402-01: Gross global Scope 1 emissions • TR0402-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets
	Services	Cruise Lines

Resource Transformation	Chemicals	<ul style="list-style-type: none"> • RT0101-01: Gross global Scope 1 emissions, percentage covered under a regulatory program • RT0101-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emission-reduction targets and an analysis of performance against those targets
	Containers and Packaging	<ul style="list-style-type: none"> • RT0204-01: Gross global Scope 1 emissions, percentage covered under a regulatory program • RT0204-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, including emission-reduction targets and an analysis of performance against those targets
Consumption	Agricultural Products	<ul style="list-style-type: none"> • CN0101-01: Gross global Scope 1 emissions • CN0101-02: Biogenic carbon dioxide (CO₂) emissions • CN0101-03: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emission-reduction targets, and an analysis of performance against those targets
	Meat, Poultry and Dairy	<ul style="list-style-type: none"> • CN0102-01: Gross global Scope 1 emissions • CN0102-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emission-reduction targets, and an analysis of performance against those targets
	Food Retailers and Distributors	<ul style="list-style-type: none"> • CN0401-01: Gross global Scope 1 emissions from refrigerants • CN0401-02: Percentage of refrigerants consumed with zero ozone-depleting potential • CN0401-03: Average refrigerant emissions rate
Renewable Resources	Biofuels	<ul style="list-style-type: none"> • RR0101-08: Lifecycle greenhouse gas (GHG) emissions, by biofuel type
	Pulp and Paper Products	<ul style="list-style-type: none"> • RR0202-01: Gross global Scope 1 emissions • RR0202-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emission-reduction targets, and an analysis of performance against those targets

Infrastructure	Electric Utilities	<ul style="list-style-type: none"> • IF0101-01: (1) Gross global Scope 1 emissions, (2) percentage covered under emissions-limiting regulations, and (3) percentage covered under emissions-reporting regulations • IF0101-02: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emission-reduction targets, and an analysis of performance against those targets • IF0101-03: (1) Number of customers served in markets subject to renewable portfolio standards (RPS) and (2) percentage fulfillment of RPS target by market
	Waste Management	<ul style="list-style-type: none"> • IF0201-01: (1) Gross global Scope 1 emissions, (2) percentage covered under emissions-limiting regulation, and (3) percentage covered under emissions-reporting regulation • IF0201-02: Total landfill gas generated, percentage flared, percentage used for energy • IF0201-03: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emission-reduction targets, and an analysis of performance against those targets

Energy Management

SASB has identified energy management as likely to be material for 37 of the 79 industries for which Sustainability Accounting Standards were developed. To measure company performance with respect to this disclosure topic, SASB developed the following industry-specific accounting metrics:

Sector	Industry	Sustainability Accounting Metric(s)
Healthcare	Biotechnology	<ul style="list-style-type: none"> • HC0101-23: Total annual energy consumed (gigajoules) and percentage renewable (e.g., wind, biomass, solar).
	Pharmaceuticals	<ul style="list-style-type: none"> • HC0101-23: Total annual energy consumed (gigajoules) and percentage renewable (e.g., wind, biomass, solar).
	Medical Equipment and Supplies	<ul style="list-style-type: none"> • HC0201-08: Total annual energy consumed (gigajoules) and percentage renewable (e.g., wind, biomass, solar).
	Health Care Delivery	<ul style="list-style-type: none"> • HC0301-11: Total annual energy consumed (gigajoules) and percentage renewable (e.g., wind, biomass, solar).
Technology and Communications	Software and IT Services	<ul style="list-style-type: none"> • TC0102-01: Total energy consumed, percentage grid electricity, percentage renewable energy • TC0102-03: Description of the integration of environmental considerations to strategic planning for data center needs
	Semiconductors	<ul style="list-style-type: none"> • TC0201-03: Total energy consumed, percentage grid electricity, percentage renewable energy
	Telecommunications	<ul style="list-style-type: none"> • TC0301-01: Total energy consumed, percentage grid electricity, percentage renewable energy; amount of energy consumed by (a) cellular and (b) fixed networks
	Internet and Media Services	<ul style="list-style-type: none"> • TC0401-01: Total energy consumed, percentage grid electricity, percentage renewable energy • TC0401-03: Description of the integration of environmental considerations to strategic planning for data center needs
Non-Renewable	Iron and Steel Producers	<ul style="list-style-type: none"> • NR0301-04: Total purchased electricity consumed, percentage renewable

	Metals and Mining	<ul style="list-style-type: none"> • NR0302-04: Total energy consumed, percentage grid electricity, percentage renewable
	Construction Materials	<ul style="list-style-type: none"> • NR0401-04: Total energy consumed, percentage from: (1) purchased electricity, (2) alternative sources, (3) renewable sources
Transportation	Auto Parts	<ul style="list-style-type: none"> • TR0102-01: Total energy consumed, percentage grid electricity, percentage renewable
Services	Hotels and Lodging	<ul style="list-style-type: none"> • SV0201-01: Total energy consumed, percentage grid electricity, percentage renewable
	Casinos and Gambling	<ul style="list-style-type: none"> • SV0202-01: Total energy consumed, percentage grid electricity, percentage renewable
	Restaurants	<ul style="list-style-type: none"> • SV0203-01: Total energy consumed, percentage grid electricity, percentage renewable
	Leisure Facilities	<ul style="list-style-type: none"> • SV0204-01: Total energy consumed, percentage grid electricity, percentage renewable
	Cable and Satellite	<ul style="list-style-type: none"> • SV0303-01: Operational energy consumed, percentage grid electricity, percentage renewable
Resource Transformation	Chemicals	<ul style="list-style-type: none"> • RT0101-05: Total energy consumed, percentage grid electricity, percentage renewable • RT0101-06: Percentage of raw materials from renewable resources
	Aerospace and Defense	<ul style="list-style-type: none"> • RT0201-01: Total energy consumed, percentage grid electricity, percentage renewable

	Electrical and Electronic Equipment	<ul style="list-style-type: none"> • RT0202-01: Total energy consumed, percentage grid electricity, percentage renewable
	Industrial Machinery and Goods	<ul style="list-style-type: none"> • RT0203-01: Total energy consumed, percentage grid electricity, percentage renewable
	Containers and Packaging	<ul style="list-style-type: none"> • RT0204-04: Total energy consumed, percentage grid electricity, percentage renewable
Consumption	Agricultural Products	<ul style="list-style-type: none"> • CN0101-04: Operational energy consumed, percentage grid electricity, percentage renewable
	Meat, Poultry, and Dairy	<ul style="list-style-type: none"> • CN0102-03: Total energy consumed, percentage grid electricity, percentage renewable
	Processed Foods	<ul style="list-style-type: none"> • CN0103-01: Operational energy consumed, percentage grid electricity, percentage renewable
	Non-Alcoholic Beverages	<ul style="list-style-type: none"> • CN0201-01: Operational energy consumed, percentage grid electricity, percentage renewable
	Alcoholic Beverages	<ul style="list-style-type: none"> • CN0202-01: Total energy consumed, percentage grid electricity, percentage renewable
	Food Retailers and Distributors	<ul style="list-style-type: none"> • CN0401-04: Operational energy consumed, percentage grid electricity, percentage renewable energy
	Drug Retailers and Convenience Stores	<ul style="list-style-type: none"> • CN0402-01: Total energy consumed, percentage grid electricity, percentage renewable energy
	Multiline and Specialty Retailers and Distributors	<ul style="list-style-type: none"> • CN0403-01: Total energy consumed, percentage grid electricity, percentage renewable energy

	E-commerce	<ul style="list-style-type: none"> • CN0404-01: Total energy consumed, percentage grid electricity, percentage renewable energy • CN0404-03: Description of the integration of environmental considerations into strategic planning for data center needs
	Building Products and Furnishings	<ul style="list-style-type: none"> • CN0603-01: Total energy consumed, percentage grid electricity, percentage renewable energy
Renewable Resources	Solar Energy	<ul style="list-style-type: none"> • RR0102-01: Total energy consumed, percentage grid electricity, percentage renewable
	Fuel Cells and Industrial Batteries	<ul style="list-style-type: none"> • RR0104-01: Total energy consumed, percentage grid electricity, percentage renewable
	Pulp and Paper Products	<ul style="list-style-type: none"> • RR0202-04: Total energy consumed, (1) percentage grid electricity, (2) percentage from biomass, and (3) percentage from other renewables
Infrastructure	Water Utilities	<ul style="list-style-type: none"> • IF0103-01: Total energy consumed, percentage grid electricity, percentage renewable
	Real Estate Owners, Developers, and Investment Trusts	<ul style="list-style-type: none"> • IF0402-01: Energy consumption data coverage as a percentage of floor area, by property subsector • IF0402-02: Total energy consumed by portfolio area with data coverage, percentage grid electricity, and percentage renewable, each by property subsector • IF0402-03: Like-for-like change in energy consumption of portfolio area with data coverage, by property subsector • IF0402-04: Percentage of eligible portfolio that (1) has obtained an energy rating and (2) is certified to ENERGY STAR, by property subsector • IF0402-05: Description of how building energy management considerations are integrated into property investment analysis and operational strategy

Fuel Management

SASB has identified fuel management as likely to be material for 15 of the 79 industries for which Sustainability Accounting Standards were developed. To measure company performance with respect to this disclosure topic, SASB developed the following industry-specific accounting metrics:

Sector	Industry	Sustainability Accounting Metric(s)
Healthcare	Health Care Distribution	<ul style="list-style-type: none"> • HC0302-06: Payload fuel economy = gallons per ton-miles. • HC0302-07: Description of involvement in efforts to reduce the environmental impact of logistics, including involvement in the EPA SmartWay program.
	Oil and Gas - Services	<ul style="list-style-type: none"> • NR0104-01: Total fuel consumed, percentage renewable, percentage used in: (1) on-road equipment and vehicles and (2) off-road equipment • NR0104-03: Percentage of engines in service that meet Tier 4 compliance for non-road diesel engine emissions
Non-Renewable Resources	Iron and Steel Producers	<ul style="list-style-type: none"> • NR0301-05: Total fuel consumed, percentage from: (1) coal, (2) natural gas, (3) renewable sources
	Airlines	<ul style="list-style-type: none"> • TR0201-03: Total fuel consumed, percentage renewable • TR0201-04: Notional amount of fuel hedged, by maturity date
Transportation	Air Freight & Logistics	<ul style="list-style-type: none"> • TR0202-03: Total fuel consumed, percentage renewable for (1) road Transportation transport and (2) air transport
	Marine Transportation	<ul style="list-style-type: none"> • TR0301-05: Energy Efficiency Design Index (EEDI) for new ships
	Rail Transportation	<ul style="list-style-type: none"> • TR0401-03: Total fuel consumed, percentage renewable
	Road Transportation	<ul style="list-style-type: none"> • TR0402-03: Total fuel consumed, percentage renewable
	Cruise Lines	<ul style="list-style-type: none"> • SV0205-05: Average Energy Efficiency Design Index (EEDI) for new ships

Services		<ul style="list-style-type: none"> SV0303-02: Fleet fuel consumed, percentage renewable
Consumption	Agricultural Products	<ul style="list-style-type: none"> CN0101-05: Fleet fuel consumed, percentage renewable
	Processed Foods	<ul style="list-style-type: none"> CN0103-02: Fleet fuel consumed, percentage renewable
	Non-Alcoholic Beverages	<ul style="list-style-type: none"> CN0201-02: Fleet fuel consumed, percentage renewable
	Food Retailers and Distributors	<ul style="list-style-type: none"> CN0401-05: Fleet fuel consumed, percentage renewable
Infrastructure	Waste Management	<ul style="list-style-type: none"> IF0201-07: Fleet fuel consumed, percentage renewable IF0201-08: Percentage of alternative energy vehicles in fleet

Clean Tax Cut Concept, Science Based Targets, and SASB Metrics – Case Study

Introduction

The [Sector Decarbonization Approach](#) (SDA) was developed by Science Based Targets, a partnership between CDP, UNGC, WRI, and WWF, to establish methodology for the calculation and comparison of individual company performance with respect to greenhouse gas intensity (carbon emitted per unit of industry-specific activity).

This metric was developed to track company performance against emissions reduction targets which were established in the 2°C Decarbonization Scenario (2DC) developed by the International Energy Agency as part of its publication, Energy Technology Perspectives 2014.

The use of this target to differentiate industry participants based on greenhouse gas emission performance offers an example of how SASB standards and the SDA be utilized for the Clean Tax Cut Concept.

SDA Methodology

Science Based Target’s SDA describes the calculation of a greenhouse gas intensity value by dividing the total amount of direct (Scope I) greenhouse gas emissions for a given company be divided by an industry-specific activity measurement. The activity level is defined as the level of production in units of economic output specific to that industry.

$$CI = \frac{Emissions}{A}$$

Above, “Emissions” describes the total GHG emissions of a given company in a given year in tons of equivalent CO₂ and “A” describes the total production of units of economic output for the given industry or company within that industry.

The SDA defines units of economic output “A” using an industry-specific measure, as described in Table 2 of the SDA Report. Examples include kilowatt-hours for the power generation sector and tons of production for industrial sector.

Interaction with SASB

Input “E” above can be directly taken from the SASB Accounting Standard reporting metric for a given industry. Per the discussion above, SASB has identified this data as likely to be material for 23 of the 79 industries for which standards were developed and therefore recommends disclosure of said data in SEC regulatory filings by issuers.

Application to Clean Tax Cut Concept

The combination of SASB’s reporting metrics with SDA’s approach may offer a pathway through which the Clean Tax Cut Concept can differentiate participants within an industry. By calculation of a company-specific carbon intensity per the methodology described above, a basis for comparison can be established among industry participants.

Conclusion

SASB's mission is to develop and disseminate sustainability accounting standards that help public corporations disclose material, decision-useful information to investors. Through a rigorous process that includes evidence-based research and broad, balanced stakeholder participation, SASB evaluated a set of 30 broadly relevant sustainability issues on an industry-by-industry basis to identify issues which are likely to be material for a given industry. For these industries, SASB developed accounting metrics to enable disclosure by industry participants for each previously identified sustainability topic likely to be material for the industry.

This accounting metric may provide a useful input to a methodology whereby companies may be differentiated for the purposes of assignment of Clean Energy Tax Cuts.

Appendix 5: GRF CTC White Paper (Sept. 2016)

CLEAN TAX CUTS & DEREGULATION

RODERIC RANDOLPH RICHARDSON

The Grace Richardson Fund
New Free Market Policy Solutions for 21st Century Challenges

INTRODUCTION

Welcome to the ground floor of a new idea.

And make no mistake, Clean Tax Cuts is a very new idea. First publicly launched this past Earth Day 2016 through a series of articles in *The American Spectator*. First public presentation in June, at the American Renewable Energy Institute conference in Aspen. Second airing at the American Sustainable Business Council Forum at the GOP Convention. Now this September, GRF, Rocky Mountain Institute, and the Sabin Center for Climate Change Law have co-convened a working group forum at Columbia University to study the concept in depth. CTC has evolved, from a simple a-ha moment in 2007, to an increasingly sophisticated, well-vetted, open-sourced policy concept.

Although new, the idea attracted high-level interest very quickly. Leading policy thinkers, like Amory Lovins at RMI, Eli Lehrer and Catrina Rorke at R Street Institute, Jimmy Kemp at Jack Kemp Foundation, Ted Nordhaus at Breakthrough Institute, and Jerry Taylor at The Niskanen Center, have all weighed in, at length, often as not through tough criticisms as perceptive suggestions, with a few pointed challenges to push the idea in directions not previously considered. All of which has served to make the concept stronger, more technologically neutral, broader-based, principles and parameters better defined and considered.

Still, it is new. Hence, this white paper will differ from most, which usually strive to offer a fresh perspective on policy concepts that have been analytically sliced and diced for decades. Clean Tax Cuts is too young for that, only at the stage where the revenue-neutral carbon tax was in 1973 when first conceived by my fellow non-economist and serial inventor, Prof. David

Gordon Wilson, an engineering professor at MIT. Forty-three years later, the carbon tax has proved fertile ground for countless economists, yielding innumerable articles, studies, economic models, books and indeed entire careers (sadly, often without awareness of the credit due to the honorable Prof. Wilson).

That sort of basic, pioneering economic work has yet to be done on CTC, and awaits only the right scholars to do it.

In the spirit of Prof. Wilson's pioneering thinking, on which CTC builds, GRF here presents a basic blueprint, laying out a theoretical foundation of a new positive supply-side policy to promote growth while simultaneously reducing negative externalities like ocean acidification or climate change. Our blueprint amounts to a good description of the basic concept, a tight *a priori* argument as to why and how it should work, some suggestive, very promising economic analysis (which while solid and respected, was not specifically undertaken with CTC in mind) and a discussion of possible design options to consider.

Like Tom Sawyer convincing his friends that it is actually incredibly fun to paint a fence, I hope to convince you that it is fun, and incredibly worthwhile, to build a powerful new climate and energy policy option, from the ground up, with a community of like-minded friends and colleagues. Consider this, perhaps, the 21st Century policy wonk equivalent of a pioneer barn raising. So please, come join in: tell us how to shape this idea, improve it, apply it to what matters most. The walls need raising, the roof beam lifting. We invite you, and gratefully welcome you, to join the very worthwhile fun.

*Roderic Randolph Richardson,
President, The Grace Richardson Fund*

EXECUTIVE OVERVIEW

The Grace Richardson Fund pioneers powerful new free market policy solutions for critical issues stuck in partisan gridlock. One such new idea, Clean Tax Cuts & Deregulation (CTC&D or just CTC), applies Ronald Reagan's supply-side tax cuts to the problems of pollution and climate risk. A conservative solution with transpartisan appeal, it offers something of highest core value for left and right: a climate fix *and* tax cuts; a clean environment, *and* less government.

Current climate policies – carbon tax, subsidies, regulation – sound to most conservatives like higher taxes and spending, more big government. It all sounds like a left-wing agenda, designed to punish “the bad guys,” sure to create economic drag, industrial destruction and job loss. Thus current policies unintentionally spark distrust, alarm, opposition and gridlock.

GRF would like to point out that there is another option, an all-winners no-losers way to cure climate change without punishing anyone or tanking the economy, simply by cutting taxes, spending and the size of government... by applying the most widely-adopted pro-growth policy in living memory, supply-side capital and income tax rate cuts, to the problem of climate risk. And it does apply. For climate change is a question of supply: supply of GHGs versus supply of clean energy, energy efficiency, and all other decarbonizing investments.

If you want more of something, tax it less. That is a basic supply-side principle from Economics 101. So all we have to do is cut marginal tax rates on all corporate, individual, capital gains, estate, dividend, and interest income for all decarbonizing investments (maybe some other related taxes too).

Doing so offers more bang for the buck. Especially when profits appear. Marginal tax rate cuts are potentially between five to ten

times more powerful than tax credit subsidies, as this paper will show. The reason is simple. Subsidies (which greatly complexify the tax code with routinely inconsistent and indefensible distortions) support many businesses that would otherwise fail, and these laggards compete with and slow down the leaders. Marginal tax rate cuts benefit only profitable companies, and the most profitable benefit the most. These are usually the low cost leaders, who, with tax rate cuts, keep the most profits, win the most new investments, grow much faster. Especially as laggards fail and stop competing. So Clean Tax Cuts accelerate the low cost leaders the fastest, much faster than do subsidies. This dynamic accelerates innovation and drives down the cost of good things, like clean energy.

But CTC is not just a niche tax cut for the clean energy sector. Being technologically neutral, it applies to every decarbonizing investment, product or practice, economy-wide. That includes energy efficiency, transformative profit-boosting fossil fuel innovation, carbon capture, storage and repurposing (as carbon materials, syndiesel, syngas, construction materials, soil, trees, etc.), regenerative sequestering land and sea use, carbon negative waste-to-clean-energy technologies, and more.

CTC avoids the problem of picking specific winners and losers among technologies by being as broad as reasonably possible, and by picking metrics instead. This paper (as well as an attached CTC white paper prepared by the Sustainability Accounting Standards Board) lays out a number of well known decarbonization metrics in wide use today, which could be used to assign tax rates.

From the supply-side perspective, the broadening of Clean Tax Cuts to include every decarbonizing investment should be regarded as a very good thing. For the broader the

supply-side tax cut, the more benefit for the economy.

Energy efficiency is itself a particularly interesting area to apply clean tax cuts. Especially from a conservative, supply-side perspective. Energy efficiency applies to every single corporation and taxpayer, from Walmart and Apple, to you and me. Efficiency metrics are already widely and easily in use by thousands of corporations and taxpayers. We can all become more energy efficient, and be rewarded by lower tax rates for so doing. Therefore, clean tax cuts for energy efficiency alone can deliver a broad, economy-wide supply-side tax cut for every tax payer, as a reward for doing something beneficial from any perspective, that is a profitable investment in any event. You don't have to believe in climate change to like the idea of more efficient, cost effective use of resources: economic efficiency is in fact, a conservative and capitalist virtue.

While decarbonization is important to climate risk mitigation, there are many other dimensions to "clean" and sustainable. CTC could secondarily target industry specific negative externalities. For instance, all hydropower might get a clean tax rate cut based on decarbonization, but low impact hydro projects that don't kill fish might get a lower tax rate than those that do. CTC is about more than just CO2.

Directing powerful capital investment flows away from negative externalities and toward positive-side "clean" practices via supply-side tax rate cuts is a new concept in economics, the fusion of supply-side and Pigovian economics,

balanced by equal measures of neo-Keynesian caution and pro-capitalist optimism. Not a small idea, positive supply-side CTC aims for a pro-growth policy capable of reducing and eliminating environmental, health and safety risks, ultimately turning capitalism into *clean capitalism*.

For fiscal balance, CTC&D specifies a maximum affordable cut limited by Harvard Prof. Greg Mankiw's calculation that a capital tax cut is half self-financing from new growth. The other half most beneficially should come from spending cuts to subsidies and regulations. If Prof. Mankiw is right, we can afford up to \$2 clean tax cuts for every \$1 of subsidies and regulations cut, and still be self-financing from growth, with potentially 10X more new decarbonization investment. However, even if we did a very cautious ratio of \$1 tax cuts to \$1 subsidy and regulation spending cuts, we would still have a highly beneficial effect on both GDP and new decarbonization investment (potential 5X increase), with net positive revenue.

So we can take a very fiscally cautious approach, matching tax cuts to spending cuts, still get a powerful GDP and CO2 benefit, and possibly even reduce the deficit.

Since the benefit of the switch is so powerful, it is likely many companies would opt to do it voluntarily. So to the extent CTC can substitute for and eliminate subsidies, we have just massively cleaned up the tax code... with taxpayers doing the switch voluntarily.

Quadruple win? Wait... quintuple?

Clean Tax Cuts & Deregulation Defined

To accelerate innovation in a positive direction, Clean Tax Cuts are primarily marginal tax rate cuts to all taxes on all capital returns from all decarbonizing investments, combined with spending cuts to subsidies and regulation. CTC&D balances and links tax and spending cuts in a certain ratio, to avoid increasing the deficit, to reduce taxes, spending and the size of government simultaneously, while simplifying and making the tax code a more efficient and powerful tool for decarbonization and growth.

While the focus of this white paper is on decarbonization and growth — via what might be called a “carbon tax cut” — we note that CTC may also usefully target reduction of other kinds of industry specific negative externalities beyond those related to carbon emissions. Investments that reduce negative externalities are herein referred to as “clean” as a reasonable shorthand.

CTC adheres to the principle of technological neutrality, which means that not only must all energy sources be encouraged to participate on an equal basis in the drive to low-carbon emissions, but all other decarbonizing investments must be included as well to avoid distorted decarbonization.

Decarbonizing investments include all energy efficiency practices, products, vehicles, property, plant and equipment, etc., clean energy (low, zero, or negative GHG emissions), fossil fuel innovation that lowers emissions, all GHG capture, sequestration and recycling via emissions-reducing carbon materials technologies, and any other decarbonization technologies that may exist now or arise in the future.

To further avoid the pitfall of picking specific winners and losers, CTC would pick metrics instead. Many such metrics are already widely

in use (Energy Star, LEED Certification, Corporate GHG accounting protocols, CDP scoring, etc.) and could be adapted to set tax rates, as discussed further below. Companies, even new technologies, would self-report auditable metrics on their tax reporting, honesty assured by existing stiff penalties for tax fraud, applicable both to companies and accountants.

CTC cuts rates on the following capital taxes for clean investments: income, corporate income, capital gains, dividend, interest, and estate taxes. This white paper primarily considers these kinds of cuts, since they are at the core of the concept. However, it is useful to point out that there are other kinds of tax rate cuts, or capital tax cuts, that might be considered as well:

Clean Capital Expensing: Accelerated depreciation has a strong effect on accelerating capital investment, which tends to have some decarbonizing effect as technological efficiency increases. Immediate write-offs for the most decarbonizing or energy efficient investments would strongly increase this decarbonizing tendency, and also have a strong growth effect. The natural spending cut to offset this powerful tax rate reduction would be other business tax credits and subsidies.

Clean Repatriation: Michael Kinstlick, Head of Standards Setting at the Sustainability Accounting Standards Board recently suggested: “Estimates of the cash US corporations are storing overseas to avoid corporate tax are on the order of \$1.5T. Yes, Trillion. What if we allowed them to bring that cash home tax-free if it were invested in green energy production?” Thank you Michael, for a great idea. I suggest we allow such firms to invest in any highly decarbonizing investments of their choice, to insure balanced decarbonization. Clean Repatriation could also prove a powerful incentive for international corporations to give up many other less efficient subsidies and tax incentives, aiding with efforts to clean up the tax code.

Other Clean Tax Cuts: CTC could include payroll tax cuts for clean investments, which would have the benefit of attracting more human capital to decarbonizing investments, and improving middle incomes along with decarbonization buildout. At the state level or internationally, CTC may include property, sales taxes, and tariffs. However, it is doubtful that any of these would have as large a growth effect as capital tax cuts. Still, worth considering.

Clean Tax Cuts could also beneficially apply to all companies and taxpayers up and down each decarbonizing value chain. For instance, CTC could apply not just to energy producers, but to producers of all technology that makes, transmits, stores and manages that low emission energy, the contractors building out the plants, grids and storage/management facilities, and the utilities that resell that clean energy. The same would be true of value chains for energy efficient products, like plug-in hybrid vehicles, not just the manufacturers, but their suppliers and resellers, etc.

By increasing returns for all decarbonizing investments, and all parts of the value chain (not just wind and solar energy producers) CTC would create a very powerful and well balanced decarbonization, and a strong positive “lift” for the entire economy: a very powerful, broad based supply-side tax cut drawing capital towards positive innovation.

CTC&D’s far more balanced decarbonization, would be less prone to intermittency issues and baseload destruction sometimes produced by distorted subsidy and regulation regimes, as discussed below. Also, while some carbon tax advocates seek the outright destruction of the fossil fuel industry, CTC instead boosts the profitable transformation of fossil fuels into a carbon materials and lower emission — even eventually, clean — energy industry through fossil fuel innovation.

As discussed herein, precise tax rates used for clean tax cuts (balanced against spending cuts)

will need to be determined by economic modeling, and later refined by actual experience. However, since, as discussed herein, clean tax cuts are a more powerful tool for attracting new investment and generating new taxable growth than are subsidies, and since, as we will show, taxpayers can afford to offer investors more in the way of clean tax cuts than subsidies without increasing the deficit, then it is very likely that clean tax cuts can be introduced voluntarily, as it will be advantageous for companies to make the switch. Hence CTC&D could trigger the voluntary abandonment of inefficient tax code distorting subsidies, which are worth less, and less powerful too.

What Clean Tax Cuts is NOT

Some people read “Clean Tax Cuts” and think “clean energy tax credits.” That would be a misunderstanding. On two counts. First, Clean Tax Cuts are not just about clean energy. Second, Clean Tax Cuts does not include the use of tax credits, which are subsidy price supports. (Possible exception: tradable clean tax credits might be useful for non-profit organizations.)

Clean energy tax credits exist in many inconsistent forms right now, have many drawbacks, and are not a new policy concept. That said, uniform, metric-based, technology neutral clean energy tax credits would be an improvement over current policy, and could have some limited use for strategic but unprofitable technologies.

Why Clean Tax Cuts?

All current climate policies have moderate to severe drawbacks, both economic and political, which limits their effectiveness. Ironically, policies intended to promote sustainability and

end negative externalities have their own negative externalities that harm their own political and environmental sustainability.

Alternatives that can potentially overcome these problems, such as Clean Tax Cuts, must be carefully considered and developed if we are to overcome the challenges of negative externalities without stifling prosperity.

To summarize the drawbacks of the three major climate policies

Subsidies support many businesses that would otherwise fail, allowing the worst to compete against and slow down the best. So subsidies fail to maximize target sector growth, but also slow down overall GDP growth. They raise (but hide) real prices, creating a distortion, and create dangerous dependency bubbles, which could collapse, greatly harming the economy. Very inconsistently applied across competing industries, subsidies support fossil fuels without justification, and wind and solar preferentially over other decarbonizing investments (despite the fact that both wind and solar are now becoming profitable without subsidies) leading both to charges of cronyism, and to actual economic distortions that create market failures.

Regulations interact with these distorted subsidies to create a distorted decarbonization, often making the market failure worse. RPS mandates, for instance, also favor wind and solar over other decarbonizing investments, such as energy efficiency, energy storage, grid upgrades, fossil fuel innovation, nuclear baseload generation, and newer, carbon-negative baseload generation technologies like waste-to-clean-energy gasification. The result is to destroy vital baseload generation, (sometimes coal, but often carbon-free nuclear power, requiring more coal or gas plants be built), which then exacerbates the intermittency problems of renewables, resulting in spiking energy prices

that destroy local industries, as in South Australia. (Clean Tax Cuts, applying equally to all the above decarbonizing investments, would produce a very different kind of decarbonization. More efficiency, storage, transmission and emission-lowering baseload innovation, would greatly reducing intermittency issues and baseload capacity destruction, while lowering energy costs.)

Regulation also is very expensive (\$2.028 trillion for the US in 2012) and significantly anti-growth, slowing GDP growth from 0.8%, up to a full two percentage points, depending on which study or time period one considers.

Carbon Tax (or Fee and Dividend), while popular among climate activists, remains persistently unpopular among elected politicians, rendering it widely ineffective in practice, regardless of theoretical effect. A carbon tax, though creative and perhaps effective economics, creates entrenched opposition because it appears punitive – its stated goal to kill all fossil fuel industries – leaving millions highly motivated to fight back. By raising taxes, it further alienates conservatives, who are allergic to the word “tax” unless followed by the word “cut.” And the likely impact of a tax on energy – higher energy prices and economic drag – alienates even more voters.

To overcome these problems, every carbon tax proposal comes with a *caboose*: a proposal for what to do with the revenue. A dividend or tax rebate for all. Corporate tax cuts. More subsidies for renewables, nuclear and hydro. Worker retraining. A payroll tax cut. R&D. Debt reduction. Rescue for Social Security or Medicare. The problem is, what was advertised as a simple solution quickly morphs into a complicated exercise in picking losers and lucky winners. And there is no guarantee that any political compromise of linked-together caboose policies (cabeese?) will actually solve the fundamental anti-growth and inflationary tendency of a carbon tax.

The most likely caboose to be included, if ever a carbon tax did become law, is some sort of public dividend for all, as this is popular among Democrats without whom a carbon tax will never pass. Yet this dividend would have only a weak growth effect, likely not enough to overcome the anti-growth effect of a carbon tax, while exacerbating the inflationary effect.

Worse, this most-likely caboose could make a carbon tax completely ineffective. There is a high risk that once the public receives dividend checks, they are going to demand the dividend checks continue forever. Any policy to raise the carbon tax so high it kills the fossil fuel industry, thus ending the dividend checks, quite likely will meet with outraged opposition from those counting on the checks. The likely political compromise could be a carbon tax set at the highest possible level that maximizes revenues and preserves the fossil fuel industry forever.

And if the carbon tax does dodge that bullet and successfully kills the fossil fuel industry, then any caboose eventually becomes an unfunded liability ballooning the public debt.

There may be a legitimate case for some kinds of subsidies or regulations to boost unprofitable

but promising or strategically important technologies. Same for limited carbon taxes. In states with little fossil fuel industry presence, carbon tax induced social friction will be less, so a carbon tax might be a successful trade off for sales and income taxes. Or nationally, after doing all we can with Clean Tax Cuts, a limited carbon tax might be a reasonable funding source to fund some useful climate change, pollution and fossil fuel related expenses: infrastructure, R&D for low emission energy, aid for flood and severe weather impacts, environmental damage mitigation, etc.). Other than these low-friction carveouts, these policies have severe drawbacks that limit their macro effectiveness.

Current climate policies raise taxes, spending and the size of government. They block, distort and coerce capital flows. In so doing, they lead to unbalanced decarbonization, harm the economy, and come across as punitive, inept and heavy handed, and so generate political friction and polarization, damaging the harmony of the nation. In sum, they undermine their own effectiveness and sustainability. So, we must ask: is there a better way?

How to Sail the Ship of State...(better)

Capital flows are a lot like water flows, or wind flows.

At some point in the early first millennium, sailors switched from using square sails, which used the direct pushing force of the wind on the back of the sail (called “drag” force in physics), to using “lanteen,” or triangular sails, which could use both direct wind force pushing on the back of the sail, and also the newly discovered “lift” force, pulling on the front side of the sail.

Lift is created by wind flowing over a curved surface creating a low pressure vacuum pulling the sail forward as air molecules spread out as they are forced to accelerate and travel further around the curve of the sail. Essentially, the vacuum reduces a barrier – the pressure of the air molecules – and the boat is literally sucked into the area where the barrier has been reduced.

Lift is a very potent innovation, a powerful, invisible force allowing ships to sail not only faster than by using drag force, but also allowing the ships to sail with more finesse, in more directions, across or into the wind, rather than just downwind. So powerful that eventually, men figured out how to harness lift to make huge machines fly, up, into the sky.

Capital flows are a lot like wind flows. Taxes, including carbon taxes, create a drag force, essentially slowing down the flow of capital, like wind hitting a sail head on. Tax rate cuts create

a “lift” force, dropping barriers, which accelerates the flow of capital. Tax rate cuts literally “lift” the economy, sucking the capital in the economy towards the draw of higher returns, accelerating it powerfully in the direction of the tax rate cut. Just as lift allows boats to sail with more finesse and power in the direction the captain chooses, the lift of tax rate cuts can also be targeted to steer the economy powerfully in a positive direction.

And guess what? Lift is stronger than drag. All expert sailors know that you maximize speed when you set the sail to maximize lift, not drag. In aircraft design, a higher lift:drag ratio is the goal of advanced wing design, delivering better climb performance, glide ratio and fuel economy. The reason is, maximizing lift while minimizing drag reduces friction.

So maybe the same is true of the lift from tax cuts? Maybe maximizing lift in a positive direction through tax rate cuts would make good socio-economic design as well, reducing social friction, powerfully accelerating positive innovation, healing the polarization of society.

So subsidy, regulation and carbon taxes (or hybrids of all three, like cap & trade) are not our only options. We can work with the other side of the sail, so to speak. We can use lift instead of drag. We can work on the positive side, not the negative side. We can work on the supply-side, not the demand side. We can use tax cuts, not taxes. Spending cuts, not spending. Less government, not more.

Like the sailors of yore, we have promising new options to explore.

The Positive Economics of Capital Tax Cuts

The Clean Tax Cuts idea departs from current climate policy by suggesting we focus, not on beating down the negative externality (as does carbon tax and regulation), but on boosting capital flows to the positive externality; not on propping up the demand side at public expense (as do subsidies and other regulations), but on profitably dropping barriers to capital flows on the supply-side. That boils down to using marginal tax rate cuts to all capital investment taxes for all clean decarbonizing investments.

Why this focus? Because lift is stronger than drag, and involves less friction. Just so, capital tax rate cuts, by simply dropping barriers to capital flows, are a more powerful growth tool than other policy options, and reduce friction. That means less political opposition, less gridlock, more harmony, more profit, more effective, sustainable policy.

Capital tax rate cuts deliver a powerful growth effect because they amplify and accelerate the normal capitalist growth process of creative destruction, promoting leaders faster without supporting failures. Capitalism is the most powerful growth engine we have, and capital tax rate cuts are the most powerful tool we have to accelerate that engine. Since capital tax rates are what capitalist investors look at most directly, those are the tax rates cuts that are likely to have the biggest, fastest effect on investment growth.

Economic studies bear this out. Many influential economists, leaning Republican or Democrat, conclude tax changes (especially capital tax rate changes) have a significant impact on growth. Tax policy often reflects that basic understanding. Tax increases, such as the carbon tax, have been proposed to reverse the growth in fossil fuels. Marginal tax rate cuts have been used frequently to promote growth,

notably under presidents Kennedy, Johnson, and Reagan.

You know there is some sort of high level bi-partisan agreement on this basic point when you read the former Chair of Bush's Council of Economic Advisors, Harvard Professor Greg Mankiw approvingly citing research of former Chair of Obama's Council of Economic Advisors, Berkeley Professor Christina Romer: "[R]ecent research by Christina Romer and David Romer looks at tax changes and concludes that the tax multiplier is about three: A dollar of tax cuts raises GDP by about three dollars." The Romer study also finds that every \$1 of tax cut raises private investment by \$11. That is eleven times the bang for the buck compared to the government spending \$11 directly.¹

Compare that to a standard 30% price support like the ITC, where \$1 of subsidy brings in \$2.33 of new investment. \$11 vs \$2.33? This suggests that capital tax rate cuts, dollar for dollar, attract nearly 5X more new investment than do price support subsidies.

The Romers' conclusions are broadly in line with that of Mankiw's Harvard colleague, Robert Barro, one of the most cited and influential living economists. Barro finds that cuts to marginal tax rates are superior to government spending in promoting growth. Barro writes: "a cut in the average marginal tax rate by one percentage point raises next year's per capita GDP by around 0.5%."² So, to put that in perspective, a 10 percentage point cut in average marginal tax rates might be expected to raise the economic growth rate 5 percentage points the following year.³

Mankiw, in his own work, finds that capital tax cuts are among the cheapest ways to promote growth, noting that "half of a capital tax cut is self-financing." By comparison, Mankiw finds that labor tax cuts are only 17% - 30% self-financing, depending on the elasticity of labor supply.⁴

Of particular relevance to CTC&D, is another Mankiw observation: "Tax relief is good for growth, but only if the tax reductions are financed by spending restraint. One exception: Lower taxes on dividends and capital gains promote growth, even if they require higher income taxes."

So, if Mankiw is correct, to the extent CTC&D can replace spending on subsidies and regulation, they will be particularly effective at producing growth. And to the extent they target dividend and capital gains taxes, they will be even more extremely effective at promoting growth, even if they do not cut spending on subsidies or regulation right away, or require some taxes elsewhere.

The Mankiw Formula and CTC Fiscal Balance

Mankiw's above calculations are extremely important for Clean Tax Cuts design parameters. They suggest a formula for insuring that CTC will never increase the national debt, and describe an upper limit of how much clean tax cut may be prudently afforded by the US economy, without increasing debt or taxes.

If a capital tax cut is half self-financing, then \$2 of capital tax cuts can be paid for by \$1 of tax revenue from new growth, plus \$1 of spending cuts from eliminated subsidies and regulation.

**\$2 Capital Tax Cuts =
\$1 New Revenue + \$1 Spending Cuts**

That formula allows us to cut taxes, spending, and the size of government, and still have a powerful impact on decarbonization without adding to the national debt.

How powerful? The implication from the Romer study is that dollar for dollar, capital tax rate cuts can attract 5X more new investment than the

ITC subsidies. *But if \$2 of capital tax cuts replaces \$1 of subsidies plus regulation, then the switch to CTC will be at least 10X more powerful than subsidies in attracting new investment.* More so, since subsidies are only part of the spending cut, then in this scenario, \$2 of capital tax cuts replaces *less than \$1* of subsidies.

However, this ratio is probably the outside limit of what should be attempted, and the Mankiw formula should be regarded as *suggesting* a range of safe ratios (tax cuts/spending cuts) for CTC policy design. Recall that labor taxes are only about 23% self-financing, as a mid-range estimate depending on labor elasticity. Writing elsewhere, referring to his study, Mankiw writes "a broad-based income tax cut (applying to both capital and labor income) would recoup only about a quarter of the lost revenue through supply-side growth effects." So that implies a ratio of \$1 of tax cuts/\$0.75 of spending cuts.

**\$1 Mixed Tax Cut =
\$.25 New Revenue + \$.75 Spending Cuts**

To be even more ultra conservative, we could use a ratio of \$1 tax cuts/\$1 of spending cuts, and we could still be roughly 5X more powerful than subsidies, and reduce the deficit to boot.

The point is, CTC&D can be introduced in a fiscally safe manner, and still be very powerful for decarbonization, growth, and deficit reduction, staying within the guidance proposed by the Mankiw formula. Clean tax rate cuts can then be deepened over time, for even more powerful decarbonization and growth, as policy makers see the actual ratios of tax cuts to revenue and growth reported over time.

CTC Launch: Voluntary, Leader-Driven

Since the Mankiw formula means more tax cuts dollars replace fewer subsidy dollars with fiscal

balance, and since those tax cuts attract far more new investment than subsidies anyway, then the switch from subsidies to CTC&D is a really good deal for decarbonizing companies and industries, more powerful and worth far more than current policy. This is especially true for the most profitable industry leaders and tech innovators, who will grow faster and more profitably under a clean tax cuts system than under subsidy schemes.

Therefore, CTC&D can be introduced voluntarily. The most profitable leaders in each industry will likely adopt CTC&D quickly, forgoing subsidies voluntarily because the value of the tax cuts is greater. When adoption reaches a certain level, say 20% of an industry or sector, then the whole industry or sector, the entire value chain, switches over to CTC&D, and that triggers broad deregulation and de-subsidization as well.

It is quite possible that in order to maximize the value of the clean tax cuts, companies would be willing to part with other subsidies and tax deductions, not related to energy, because deeper clean tax rate cuts would be worth more to the company than those complex tax breaks. Especially if CTC includes powerful incentives such as Clean Capital Expensing and Clean Repatriation. CTC&D could be a strategy to voluntarily wean the American tax code off of all manner of complex tax breaks, in favor of a more uniform Clean Tax Code. Full analysis of that possibility is beyond the scope of this white paper, but worth further investigation.

Positive Supply-Side Economics?

CTC creates the same basic tax differential between high and low emission investments as does a carbon tax, but in a manner that works entirely by lifting capital flows to positive externalities, rather than by suppressing cash flows to negatives externalities.

In both cases, money wants to flow. The key difference?

It is easier to go with the flow, than to fight the current. It is easier to encourage people to do more of what they already want to do, than to stop people from doing what they really want and need. That is why CTC should be politically easier and economically more powerful. That is why working on the positive side is inherently easier, more efficient, more powerful. Less friction.

In terms of economic theory, CTC fuses elements of both supply-side and Pigovian economics, to solve problems with both.

Supply-side tax cuts boost growth powerfully, but also boost free riders along with everyone else, and so contribute to the problems of negative externalities. Which leads to the criticism of free market capitalism that it may generate wealth, but also simultaneously devastates the environment and health. (Not a completely correct criticism, but not entirely wrong either.)

Pigovian taxes, like the carbon tax, seek to solve the problem of negative externalities, by taxing the negative externality directly in order to suppress demand. But all such taxes create economic drag and raise prices, reduce growth and employment, and can kill industries. Therefore they create their own political opposition and gridlock.

CTC fixes the drawbacks of both supply-side and Pigovian economics by combining them. By acting positively on the positive supply-side (to lift cash flows to the positive externalities), positive supply-side tax cuts offer a powerful pro-growth tool for eliminating the problem of negative externalities. At once it avoids the tendency of Pigovian taxes to raise prices and slow growth, and the tendency of pure supply-side tax cuts to allow negative externalities and free riders to befool the otherwise admirable achievements of capitalism.

It should be no surprise that by deliberately acting positively on the positive-side, the result is an all-positive policy, that punishes no one, that reduces all harm. All carrot, no stick, positive supply-side tax cuts offer a profitable path to clean capitalism.

CTC&D adds a neo-Keynesian element to this synthesis as well. Prof. Mankiw's calculations of the revenue growth effects of capital tax cuts are much smaller than the overly optimistic claims of some of the early supply-siders, and indeed form part of the neo-Keynesian critique of those supply-side claims. As such, it seems prudent to accept Mankiw's more cautious calculations, and embed them into the design of CTC&D, as guidance for a range of ratios of tax cuts to spending cuts. If CTC&D stays within that range, we should not add to the deficit.

It is worth noting that the CTC&D approach, limited by the Mankiw formula, sidesteps the problem of carbon pricing. The problem being that the "price of carbon" is not a true market price like the price of copper, but rather a collection of widely varying estimates driven by differing assumptions about unknowable future events over which there is great disagreement. It is one of those numbers in math, science and economics where, we are pretty sure there must be a correct number, but no one quite agrees what that is. A lot like the optimal tax rate on the Laffer Curve, for instance, were estimates of economists range from roughly 10% to 80%.

The CTC&D approach is simpler: we know we want decarbonization, and we want as much of it as we can afford without killing our economy. The Mankiw formula could be used to model and show us how much we can afford by cutting spending on subsidies and regulations, without raising taxes or the debt.

That kind of modeling is yet to be done, and will require additional expertise. Such analysis will help us determine the precise clean tax rates we can afford.

Stronger Than a Carbon Tax?

Modeling and experience will also tell us whether CTC&D alone is sufficient to stay within the 2°C target. Hopefully, likely yes, because of the powerful growth effect it targets at decarbonization.

If you believe a carbon tax can stop climate change, then understand there is every reason to believe Clean Tax Cuts will be more powerful than a carbon tax.

First understand why it would be at least as powerful. Clean Tax Cuts sets up the same tax differential as a carbon tax, but by cutting rather than raising taxes. If it is the same tax differential, then it stand to reason it would be comparably powerful.

Second, CTC is likely to be MORE powerful than a carbon tax. Why? Because many economists believe sales taxes will harm growth less than income taxes, especially capital taxes. Another way of putting this is that sales taxes have less impact on growth. Which why some supply-side economist think a trade off of a carbon tax (which is a sales tax) for supply-side tax cuts would be a good deal. Sales taxes harms the economy least, capital tax cuts benefit the economy most.

The point is, a carbon tax has LESS impact than capital taxes, against growth, as a tax, or pro-growth, as a tax cut. Therefore, using capital tax rate changes will be a stronger tool against climate change than using sales tax rate changes, dollar for dollar. The tax multiplier effect is greater. So Clean Tax Cuts will be stronger than a carbon tax, dollar for dollar. And far better for GDP growth.

So if a carbon tax is, as some think, an effective tool for climate change, then Clean Tax Cuts would be more so.

Diehard carbon tax advocates may beg to differ, but there is a strong argument why CTC&D

should be the first fiscal line of attack on climate change. It is stronger, more purely economically beneficial, less socially fractious, politically easier. It should take the lead, be the steady, friendly workhorse that gets the job done without causing problems.

Only if CTC proves itself not quite up to the job should an incremental carbon tax be considered. First, as a revenue source for infrastructure, climate impact mitigation and clean energy and decarbonization R&D. If that does the trick stop there. If not, one option could be to pay for deeper clean tax cuts by adding more carbon tax, for a powerful double barrel effect, working both supply and demand sides, boosting positives and suppressing negatives simultaneously. Fortunately, in that case, CTC would counter most of the social friction and economic drawbacks arising from a carbon tax.

CTC can reduce, and perhaps eliminate any need for a carbon tax. That should be welcome news, and the extent possible should be carefully studied.

Metrics and Sectors

Technologically neutral, CTC seeks to reward all decarbonizing investments on an equitable basis across the entire economy, with tax rate reduction tied to the degree of decarbonization. The good news is there are already a variety of well known metrics already in use that could be adapted to that task.

For instance, more than 5,500 corporations voluntarily disclose GHG accounting data to CDP (formerly Carbon Disclosure Project). CDP scores corporations on GHG reduction using the Corporate Standards developed by the World Resources Institute GHG Protocol, which is widely considered the global standard for GHG accounting. CDP issues grades, 1 - 100, grading disclosure practices, and A through E,

measuring how effectively a company is addressing climate risk.

A corporation's tax rates could be lowered according to their CDP score. This method has the advantage of simplifying all decarbonization considerations for a complex corporation (fleet efficiency, energy intensity of operations, use of renewable energy, etc.) into one final score. And we know it is not overly burdensome, as 5,500 corporation already voluntarily disclose this information.

Alternatively, if some corporations and taxpayers find it simpler to receive tax rate reductions for separate components of decarbonization at the project or product level, the EPA's well known Energy Star Program, or alternatively, LEED Certification ratings, measuring efficiency for homes, buildings, industrial plants and consumer products, could be used to set benchmarks for energy efficiency gains that merit tax rate reductions at that level.

So we have lots of metrics we could use. However, it is not clear if one single, simple metric will cover everything. But perfection is the enemy of the good, they say. It may be that different sectors and kinds of decarbonization are more simply and easily measured by sector specific metrics.

Indeed that is exactly the approach suggested by the Sustainability Accounting Standards Board (SASB) in their white paper "SASB Overview for Clean Tax Cuts Concept." Their key point being, some metrics are more material for some sectors than others.

To the end of setting CTC tax rates, the SASB paper examines how SASB metrics can interact with the Sector Decarbonization Approach (SDA), a methodology developed by Science Based Targets, a partnership between CDP, UNGC, WRI, and WWF, "for the calculation and comparison of individual company performance with respect to greenhouse gas intensity (carbon emitted per unit of industry-specific activity)."

The paper concludes: “The combination of SASB’s reporting metrics with SDA’s approach may offer a pathway through which the Clean Tax Cut Concept can differentiate participants within an industry. By calculation of a company-specific carbon intensity per the methodology described above, a basis for comparison can be established among industry participants.”

SASB analyst David Parham offered further insight in correspondence exemplifying the use of SASB metrics:

Basically, I was thinking a “carbon intensity” metric might be appropriate for differentiation of companies within an industry (note that this synergizes well with SASB’s industry-based approach)... As an “intensity” based metric is a ratio of two values (how well are you able to do A with respect to B), it felt like a good fit for this [CTC] concept. For a company in a given industry, how well is it able to produce A with respect to emissions B, how does it compare to its peers, and how does it compare to the industry average? Further, how are these values changing over time? Is a company improving relative to its peers? Is the industry improving? Are certain companies outpacing the industry gains, and are others falling behind the curve?

For the power generation industry, the metric we had discussed was a ratio of greenhouse gas emissions to power produced. The SDA metric “activity” measure for the power industry is power produced so this would actually be pretty much exactly aligned with what we had discussed initially.

Regarding company and industry based measurements, I believe the SDA approach might offer a framework where

an industry-specific ratio (emissions per output) could be defined that make sense for the “output” of each industry – energy, power, consumption, transportation, etc. As we had discussed, individual company performance could then be compared to an industry average value. These values could be calculated annually, industry participants ranked, and performance against the baseline tracked. This is essentially what the SDA is suggesting, but framed to track performance against 2DC targets.

For CTC, as previously discussed, the industry progress over time (emissions per output) could be tracked, and individual company performance against the industry could be tracked and stratified for the purposes of assigning tax rate cuts.

So, for the power sector, the metric might be total Scope I emissions divided by kWh of power produced, for example. For power companies using more coal relative to natural gas, this number would be relatively high. Substituting natural gas would produce the same amount of power with lower emissions, leading to a higher “score.” The benchmark would reflect the industry average.

As noted above, as the industry is incentivized to produce cleaner energy based on CTC, the industry average would be driven down. If designed correctly, this could create a natural motivation for companies to continually improve as companies seek to “keep up” with the industry average for the purposes of access to CTC tax rate cuts.

Following this suggestion, CTC might offer a range of rates corresponding to rankings of

emissions per output. How deep the range would go (from existing tax rates down to 25%, 20%, 15% or 10%, for instance) would need to be set by the analysis of what rates can be afforded by cutting subsidies and regulations. The lowest emitting technology or company would win the bottom rate, and anyone under the sector benchmark (either sector average or something else) would get rate reduction according to ranking.

The competition for better rankings and tax rates should make entire industries and sectors, indeed the entire economy more energy and carbon efficient over time, at an accelerated rate versus current practice. Benchmarks will move, as industry and sector averages improve. That should be a powerful way to turn capitalism into *clean capitalism*.

A question deserving further study: How should CTC award tax rate cuts to companies that make: (a) energy efficient products; (b) clean energy technology, like solar panels, wind turbines, waste gasifiers; (c) storage and transmission, resilient grid management systems; (d) fuel efficient vehicles vs electric vehicles; (e) fossil fuel innovations like those of ZHRO.com (f) construction companies, contractors and architects that build energy efficient, low emission buildings and plants?

Such companies, while not necessarily clean energy producers themselves, are decarbonizing in at least two different ways: 1) from reducing carbon intensity of their own operations; 2) from the reduced carbon emissions or intensity resulting from the use of the products they produce. We certainly want to reward them for both. That implies a derived CTC tax rate, with a component from both considerations.

A derived rate also suggests that each product's profits might have a separate CTC rate depending on some metric (such as GHG emissions/Kwh for things like wind turbines, GHG emissions per mile for vehicles, Energy Star Rating for appliances, LEED Certification

rating for buildings, etc.) relative to a benchmark, such as an average for the industry or the sector.

So a manufacturing company's CTC tax rate (for all associated capital returns to investors as well) would be derived from (a) a rate reduction awarded for a score for carbon intensity of operations relative to a sector benchmark; (b) a weighted-average rate reduction for all product profit streams, based on a energy or carbon efficiency score for each product. How to accomplish this most fairly and simply will be the subject of further study.

Electric vehicles, as well as electric storage, transmission and grid management contribute to decarbonization in a manner that might be difficult to calculate. Such technology is only as GHG free as the power source. A coal powered Tesla has a very different GHG profile than one powered by nuclear or solar. However, all of these technologies allow the grid to better accommodate more intermittent renewable energy sources with better supply and demand management, and less risk of power shortages. Together, they should help lower the carbon intensity of the overall US electric market, and improve national energy security and resiliency. Especially if the entire power sector is powerfully incentivized to decarbonize by Clean Tax Cuts.

Therefore there is a strong argument to award these technologies low CTC rates because they assist overall decarbonization and resiliency of the power sector, even if that is not measured in their emissions equally in every region right away.

Fossil fuel innovators (which are disadvantaged by the current distorted subsidy regime) deserve CTC rate reduction since they help reduce fossil fuel emissions and help transform the fossil fuel industry into a carbon materials and clean energy industry. ZHRO, for example, reduces emissions for trucks, with a diesel-to-compressed-gas conversion kit. A reduced

CTC rate could be awarded for profits from the kit, based on how well the ZHRO kit reduces truck emissions below the industry average, versus competing products.

ZHRO's other product is a system which captures flare gas from oil or gas wells (reducing emissions there), splits flare gas into methane (which can power well production systems, reducing emissions from grid power), and splits the junk gasses into carbon fibers and clean H₂, used to produce clean power or fuel cells. This product's profits could receive a reduced CTC rate based on how well it reduces gas and oil production emissions below the industry average, versus competing products. In addition, well operators who purchase the ZHRO system would see their taxes reduced as their carbon emissions drop below industry averages, and the carbon materials and clean energy they sell would receive the lowest CTC tax rates.

These are preliminary suggestions as to how CTC might be applied in practice, using available metrics. GRF and CTC working group participants welcome helpful suggestions and comments.

Deregulation & De-subsidization

Not surprisingly, the regulatory reforms and subsidies cuts contemplated by CTC are nearly identical to those proposed by some carbon tax advocates. The Niskanen Center, for example, rightly points out that a powerful, market driven solution to climate change would allow the termination of inefficient, expensive and distortionary subsidies and regulations. They have done a wonderful job of cataloging the many programs worthy of the chopping block. Since there is no added value in GRF reinventing the deregulatory wheel, we gratefully refer readers to their excellent work on the subject.

An excerpt from their most recent “Carbon Tax 2017” presentation is attached, covering programs to be cut.

Conclusion & Next Steps

Reason and some solid evidence suggests that Clean Tax Cuts & Deregulation could be a powerful way to accelerate both clean innovation and growth: decarbonization with more profit, less cost and less government. To date, even the strongest critics of CTC acknowledge it could be more politically appealing across the spectrum than other climate policies. And no critic has yet been able to offer a sustainable argument that it would not be effective, powerful, growth oriented, or feasible.

So far, so good.

But more work needs to be done. CTC must be modeled, for economic and climate impact. Also, for design purposes. How much inefficient energy and climate spending can we cut, and how would that translate into how much Clean Tax Cut we can afford? How much other non-energy spending and tax code subsidies can be chopped away, so we can afford even more powerful decarbonization?

Metrics and how they should be most simply and effectively applied could use further study, and input from a variety of experts. Other kinds of decarbonizing investments also need closer consideration, such as regenerative agriculture and forestry, or air capture, or waste-to-energy gasification. Clean Repatriation and Clean Capital Expensing should be further explored, as should the application of CTC to payroll taxes, and state-level property and sales taxes.

International applications need to be considered. Would it be easier to set a global clean tax cap — a global maximum tax rate for decarbonizing investments — than to negotiate

other kinds of climate treaties? How should CTC interact with tariffs and trade agreements? How might it apply in other countries?

How might or should CTC apply to other industry specific negative externalities, such as fish kill or bird kill by renewable energy technologies boosted by CTC? To problems posed by plastics, or water resource depletion, or deforestation?

Getting Clean Tax Cuts & Deregulation right will take a community effort. Outreach will be important to find the right people with the right talents, resources, experience and ideas.

Then, of course, the most important next step will be for the those who realize they have something to contribute to step forward, help shape this concept, save the planet, and turn capitalism into clean capitalism.

And don't forget to have some fun.

FOOTNOTES:

- 1 Christina D. Romer & David H. Romer, 2010. "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks," *American Economic Review*, American Economic Association, vol. 100(3), pages 763-801, June. While the study looks at all tax changes, not specifically marginal rate cuts to corporate and capital gains taxes, the Romers' 1:3 tax multiplier is based upon a study of post-WWII exogenous tax changes (such as the Kennedy, Reagan and Bush tax cuts, or the Clinton tax hike) which are actually heavily weighted to marginal tax rate changes. So the part of their results I am citing (multipliers based on exogenous tax changes), would still be strongly suggestive concerning the impact of marginal rate cuts to corporate or capital gains taxes.
- 2 Robert Barro & C.J. Redlick "Macroeconomic Effects of Government Purchases and Taxes", *Quarterly Journal of Economics* , February 2011
- 3 The sector specific growth effect from Clean Tech Tax Rate Cuts is likely to be stronger than the kinds of economy-wide growth effects these macro economists measure, because these are asymmetrical tax rate cuts, which focus growth on decarbonizing investments.
- 4 Mankiw, N. Gregory and Matthew Weinzierl. "Dynamic Scoring: A Back-of-the-Envelope Guide," *Journal of Public Economics*, 2006, v90(8-9,Sep), 1415-1433