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CCME

Center for Carbon Management in Energy

CCME Report from the 45Q Symposium

Authored by the Center for Carbon Management in Energy

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EXECUTIVE SUMMARY

Carbon capture, utilization and storage, or CCUS, has been identified by the International Energy Agency and the U.S. Energy Information Administration as a critical technology for reducing global CO_2 emissions. The National Petroleum Council has been recently charged by Energy Secretary Rick Perry with studying and making recommendations for the broad commercial deployment of CCUS. And the marketplace is finally at a point where CCUS is no longer simply a topic for institutional research and analysis, but instead a demonstrated commercial opportunity.

The market is in transition. But it is critical that accomplishing meaningful reductions of CO_2 emissions be done in a manner that is accretive to investors. CCUS is not a waste disposal model. It is instead a technology and a solid business investment that reduces CO_2 emissions. Section 45Q of the federal tax code is a key way to create this market movement and to support the objective of a sustainable business investment, although it is not a panacea and will require further modification if it is to help the technologies and business practices reach their full potential.

First enacted in 2008 and subsequently modified, 45Q now addresses all manmade, or anthropogenic, captured carbon emissions and requires new projects to begin construction prior to Jan. 1, 2024, in order to qualify for the credits. In addition to CCUS, the credits have been extended for direct air capture technologies, and the credits for geological storage and enhanced oil recovery have been increased.

45Q presents significant business model potential for the engineered capture of carbon from various sources and for its delivery to a potential endpoint– to enhance oil recovery (EOR) in mature and developing fields while permanently storing the CO_2 in the process or for direct long-term storage, positioning the industry to significantly reduce its carbon footprint.

At the Center for Carbon Management in Energy at the University of Houston, we have identified key drivers and potential obstacles to realizing all that 45Q can enable, including:

a. **The Size of the Prize.** The opportunities for 45Q applications for CCUS in EOR or storage in geological formations have potential both in the U.S. and globally, onshore and offshore. The potential targets are large, and the opportunity is likely to grow as the geologic information and exploration continue to expand into unconventional formations, as well as in previously unexplored regions of the world.

b. **The Permian.** With production of 3.2 million barrels of oil per day in 2018, expected to grow to 7 million barrels per day by 2022, the Permian Basin offers enormous potential for additional recoverable oil in both conventional and unconventional plays. The residual oil zone (ROZ) is a geologic opportunity for oil recovery as impactful as a doubling of recoverable oil potential. There is also substantial geologic capacity to store CO_2 in these formations, and 45Q will make storage a new value proposition. The investment community is already acting upon 45Q opportunities in the region.

c. **Tax Equity Partnerships.** The experience of Core Energy, a midsize exploration company from upstate Michigan, illustrates the realities of implementing CCUS technology, realizing a plan to successfully report measurement and verification to meet IRS standards for 45Q, and the business challenges that remain. While the technology performs effectively and the resulting recovered oil is being produced, the tax structure requirements are not aligned to realize the business benefits without having a tax equity partnership structure in place.

d. **Non-governmental Organizations.** Broad implementation of CCUS requires an alignment of the business and environmental communities. CCUS requires attention to all regulatory requirements, including that CO_2 storage be safe, permanent and verifiable. Regulatory responsibility, coordination and enforcement all will be required, and the business/community partnership is more than simply regulatory compliance but an invitation to operate in the communities and regions affected.

e. **Regional Partnerships.** A decade of research involving regional CO_2 partnerships has progressed the technology and know-how exponentially. Risks associated with geologic storage have been driven to a level suitable for commercial investment. While there is no recipe for determining the exact level of business and commercial risk, the technology is ready for additional commercial opportunity in the market. Partnerships detailed in this paper demonstrate the broad-based opportunities across the US.

f. **Life Cycle Analysis.** Work by the Energy & Environmental Research Center (EERC) at the University of North Dakota has explored the impact of 45Q credits on CO_2 emissions, along with the impact of using the captured CO_2 to produce additional hydrocarbons via enhanced oil recovery projects. Hydrocarbons produced using the captured carbon have a lower net carbon impact than that of non-CCUS produced oil.

g. **It's Happening Today.** The Petra Nova project located near Houston offers insight into a commercially viable CCUS operation.

At the end of this paper is a step-by-step analysis of the most recent 45Q language made ready for public comment during summer 2019. A large segment of a recent workshop hosted by the Center for Carbon Management in Energy was dedicated to this point-by-point analysis. In addition, the analysis speaks to steps and revisions we believe are necessary for the investment community to realize broad commercial deployment. We anticipate this segment will offer a useful review for both the business and legal communities.

Simply put – 45Q has catalyzed the CCUS marketplace at a level not previously seen in the US or elsewhere. But challenges lie ahead if we are to realize broad commercial deployment and the associated investments and environmental impacts. This paper offers suggestions for improvement, necessary clarifications and steps to lower investment risk.

Broad deployment in the US improves the likelihood of its expansion globally. That is real sustainability.

Acknowledgements

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BACKGROUND

Congress has expressed a longstanding and expanding desire to enhance the incentives for carbon sequestration through the tax credit afforded in section 45Q.

Section 45Q's predecessor was enacted in 2008 to provide a tax credit for sequestration of carbon dioxide,[1] and that prior provision was amended in 2009.[2] Congress in 2018 (through the Furthering Carbon Capture, Utilization, Technology, Underground Storage, and Reduced Emissions Act (FUTURE) Act) expanded the scope of section 45Q so the tax credit applies to sequestration of carbon oxides and substantially increased the credit for carbon oxides captured with equipment placed in service after 2017.[3] Congress also provided that certain applicable facilities would be entitled to the expanded benefits of the new section 45Q tax credit in certain events.[4]

45Q clearly has much potential, but it also leaves many topics unclear, leading to risk, concerns and the probability that the maximum impact of CCUS will not be realized.

The Center for Carbon Management in Energy (CCME) engaged with a broad group of stakeholders during a daylong workshop on the Monetization of Carbon, focusing on the technology, legal and policy impacts of Section 45Q.

Based on the belief that successful implementation of CCUS and other carbon management technologies must add value for both the environment and the commercial marketplace, the workshop brought together globally recognized speakers from the energy industry, academia, government and nongovernmental organizations to discuss the challenges and successes. This paper is based on presentations by those speakers and serves as the next step in the center's work to educate participants in the marketplace as well as the workforce of the future, and to be at the center of the solutions required for CCUS to be broadly deployed, commercially sustainable and environmentally impactful.

The workshop discussions were constructed to assess the opportunities for using 45Q across a number of key areas. We also posed some of the unknown challenges.

Key to this discussion is the understanding that CCUS is not a waste disposal model – it is a technology and business proposition that reduces CO_2 emissions and should be supportive of accretive business investment. 45Q is currently the most effective way to create market movement in this area.

THE POTENTIAL SCOPE OF THE RESOURCE

An internationally known geologic resources assessment firm, Advanced Resources International (ARI) has conducted exhaustive studies of target areas for geologic applications of EOR, as well as potential targets for storing CO_2 in formations that can offer a safe and permanent repository. ARI president Velo Kuuskraa offered key findings:

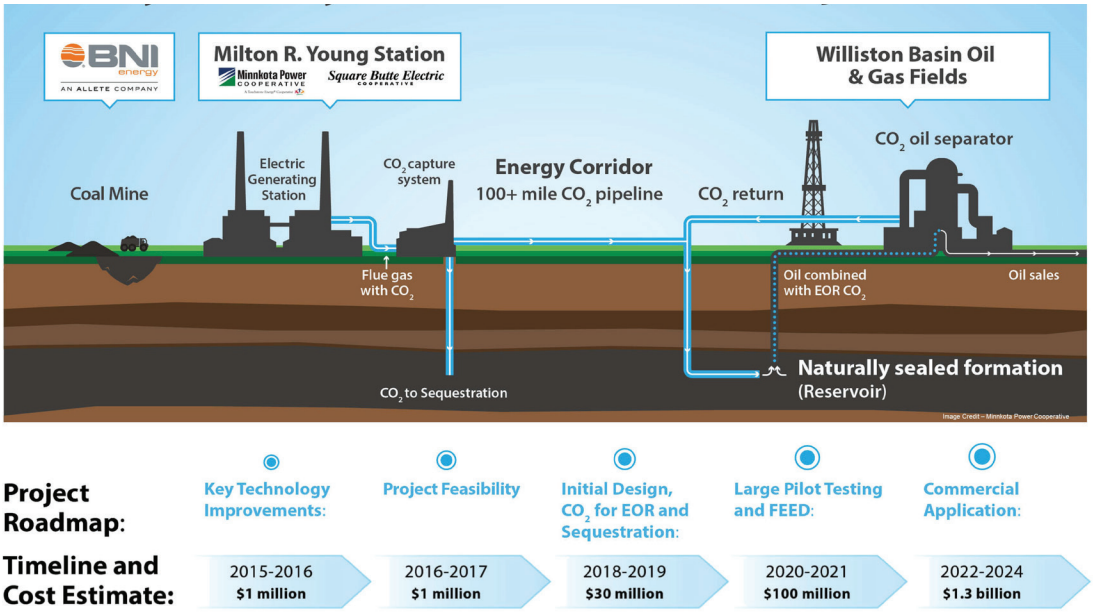
- EOR is not a "niche" opportunity. There is enough geologic capacity in the US and globally to store CO_2 emitted over decades.
- Offshore geologies have recently been explored, revealing great potential for storage targeted to offshore and ultimately deep water formations
- There is strong potential for EOR globally.

Project Tundra (see Figure 1) has recently received project development funding from the US Department of Energy and the state of North Dakota and illustrates the opportunities to deploy CCUS on existing fossil fuel based electricity production facilities – both coal and natural gas. The project will employ both CO_2 long-term storage technology as well as enhanced oil recovery (EOR) and can be structured as an ideal candidate for 45Q treatment for long-term economic benefit.

Much of the developmental project and site scoping has been an ongoing part of the PCOR regional sequestration partnership and the leadership of the Energy and Environmental Research Center (EERC) in North Dakota. This platform of knowledge has provided an opportune project scope to deploy CCUS and validate the value creation from CCUS. The state of North Dakota has made a strong statement to the marketplace that all forms of energy and advanced technologies go hand in hand.

It is interesting to note the common misconception that CCUS is "too expensive."

Figure 1: Utility Industry Carbon Solutions - Project Tundra



Projects such as Tundra establish the real costs, suggesting a cost effective option in a sustainable carbon constrained energy future. The power produced is carbon-free and baseload for 24/7 operations.

It should be noted that the term CCUS in this paper is meant to be inclusive of the term CCS (carbon capture and storage). Our view is that all forms of CCUS – including CCS – offer opportunities and technologies designed to capture CO2 before emission to the atmosphere and that the safe and permanent storage of CO2 is a necessary component. While CCS technically does not speak to "utilization" in the classic form, we consider pure storage and realizing a value for the stored CO_2 is in fact utilization. Although there is a distinction made in the 45Q tax credit structure ($35/ton for "utilized CO_2 in EOR and $50/ton for storage only), the fundamentals remain the same.

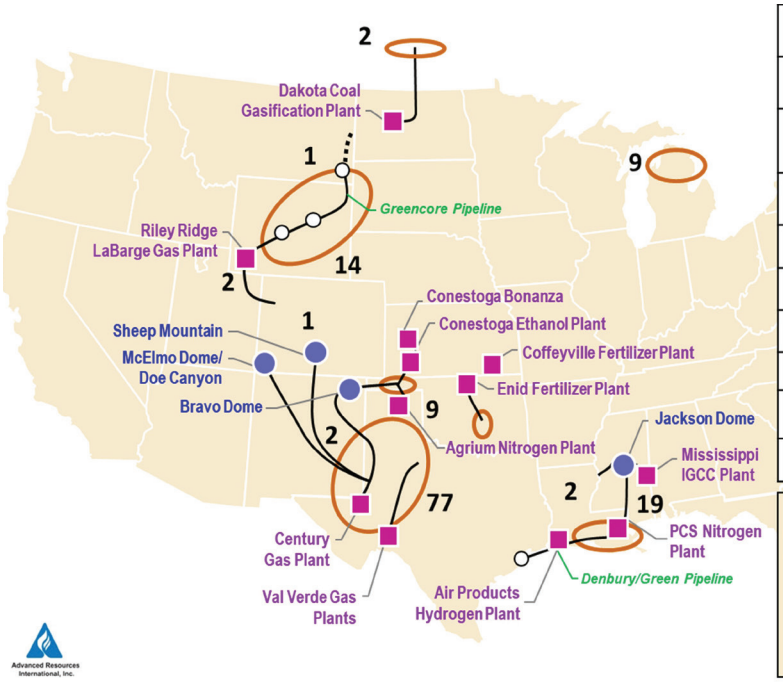
Available formations for storage and cost (see Figure 2 and 3) need not limit deployment of CCUS. Capture and processing of the CO_2 must be matched to the EOR or storage site in order to maximize the business case. Location could be a limiting factor in the broad opportunities for EOR, but experience in the Permian offers an optimistic outlook for the potential of CCUS, the integration of a pipeline delivery system to multi-site locations, and the use of 45Q to address the overall cost of capture and delivery.

Steve Melzer, president of Melzer Consulting, noted several examples of investments and CO2/EOR tests, suggesting the expansion of 45Q has spurred significant investor interest in the Permian. With the clear potential for even more expansion in Permian ROZ, 45Q is providing a monetizable mechanism for investors and project participants. ROZ resources have been estimated to represent a doubling or more of oil production potential in the Permian and can open vast opportunities for growth and energy security long term by employing CCUS.

Yet challenges remain. These include both transporting the oil that is produced in the West Texas oilfields to refining centers along the Gulf Coast and transporting the CO_2 to the target zones for EOR or storage.

In addition, the Permian fields, conventional and unconventional, have other challenges, including water use, water disposal and the need to develop and accommodate both sustainable operations and growth. Pipeline infrastructure for CO_2 deliveries is critical, but so too are pipelines to deliver crude oil to markets for refining.

Figure 2: Current CO_2 EOR Operations and CO_2 Sources (2014-19)



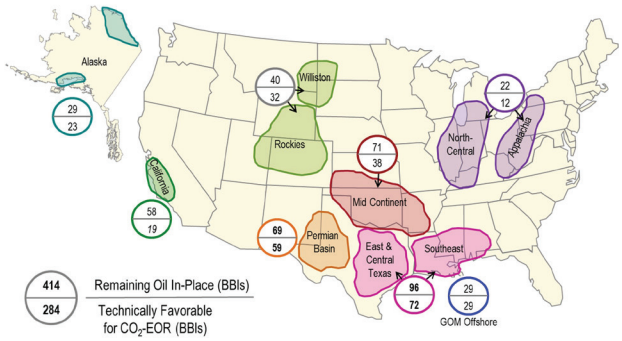
Oil Production (2014)	
CO_2-EOR Projects	136
Oil Production (MBbl/d)	300
CO_2 Supplies (2019)	
Number of Sources	17
• *Natural*	*5*
• *Industrial*	*12*
CO_2 Supply (Bcf/d)	3.3
• *Natural*	*2.2*
• *Industrial*	*1.1*

136 No. of U.S. CO_2-EOR Projects
Natural CO_2 Source
Industrial CO_2 Source
CO_2 Pipeline
CO_2 Proposed Pipeline

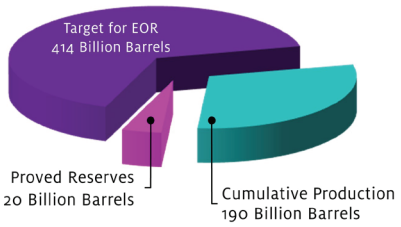
Source: Advanced Resources International based on Oil & Gas Journal and other industry data, 2014-2019.

Figure 3: US Oil Resources Favorable for CO2-EOR and the Potential Impact on Conventional Oil Resources

Domestic Oil Resource Favorable for CO_2-EOR



Original Oil In-Place: 624 B Barrels
Remaining Oil In-Place: 414 B Barrels



*Does not include "tight" oil production or reserves.

Source: Advanced Resources International, 2018.

In short, CCUS investment and the use of 45Q in the Permian is expected to continue to grow, as will demands for advances in technology. Longer term, the Permian provides one of the largest sinks for CO2 utilization and EOR, as well as long-term storage. The key to short-term, wide scale deployment of CCUS will be progress and success in the Permian.

A CASE STUDY - BENEFITTING FROM REGIONAL PARTNERSHIPS

While the Permian will play a large role in near-term future adoption, Core Energy has used CCUS for over a decade in northern Michigan. Core Energy has extensive experience with the Battelle-led Midwest Regional Carbon Sequestration Partnership (MRCSP), one of seven regional partnerships established by DOE to assess the technical potential, economic viability and public acceptability of carbon sequestration.

Oil is produced from geologic reef formations in the region, and there is strong potential for increased oil production.

Core has accomplished one of the fundamental requirements for using 45Q – an IRS-approved measurement and verification plan to quantify the CO_2. Core officials report the working relationship with MRCSP assisted in building the necessary technical and commercial framework to safely and permanently store CO_2 in upstate Michigan.

The company has taken a dual approach to field development, seeking to capture value from both the oil produced from the EOR process and to consider the potential CO_2 storage value. Core began to implement the strategy even before the most recent 45Q revisions.

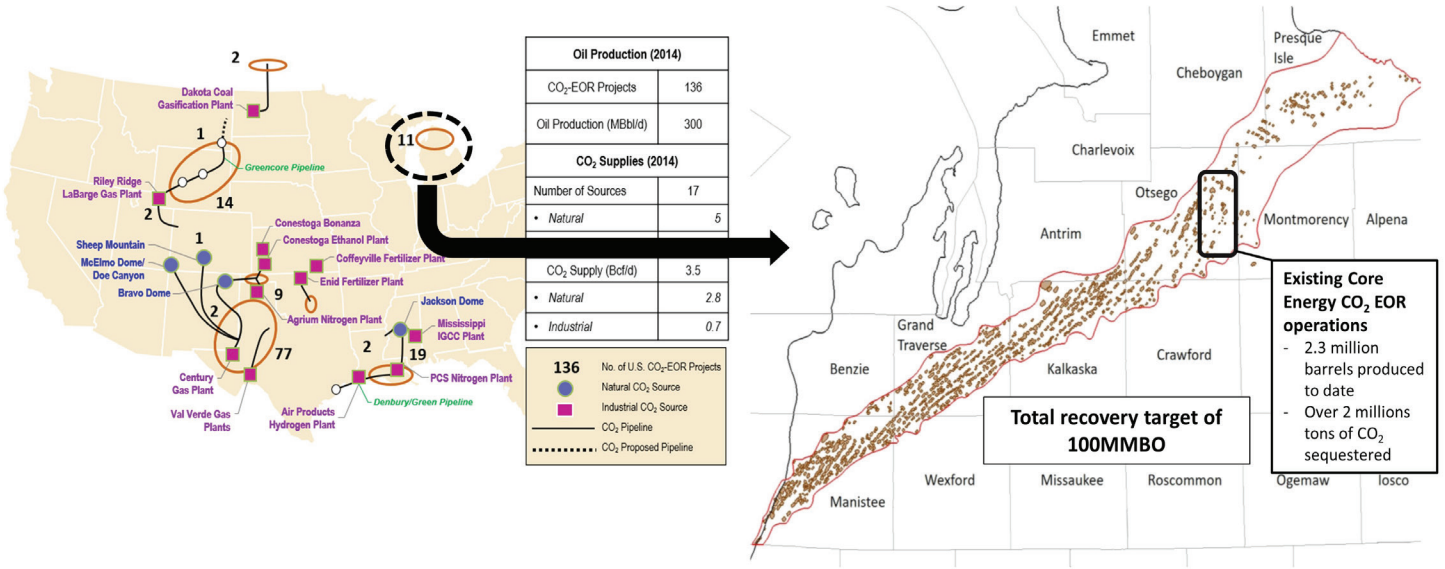
The technology and operations are in place and functioning. Core also developed a strategy to deal with the structure of 45Q, which requires the capture investor to have a tax appetite substantial enough to realize the value. That is, the value of the tax credits can't be realized unless the company balance sheet can accommodate such credits. This is a major challenge for many independent operators, which Core CEO Bob Mannes addressed.

"Our challenge has never been in the technical or transactional areas, but in the ability to form the tax equity partnership Core would require to realize the 45Q credits," he told the workshop audience. Core was simply not large enough to take advantage of the tax credits offered by the provision without using a tax equity partnership mechanism.

Independent operators want to participate in the CCUS marketplace, and 45Q is a strong enabler. The ability to realize commercial benefit is critical and will require further refinement.

Core Energy's experience provides a classic example of a business activity integrated into a community, bringing economic value through jobs and commerce that support the oil and gas industry while remaining aware of and responsive to the needs of citizens and the environment. It

Figure 4: Existing Operations of Core Energy in Michigan



Source: Core Energy, 2019.

also shows an O&G independent can be nimble enough to make the investments to capture CO_2, which enables the EOR step, which then creates the ability to use the 45Q credit, and still be limited because the company balance sheet doesn't meet the requirements to use the tax credits. That is likely to be an ongoing challenge for independent O&G operators.

Environmental concerns about CCUS are common but not insurmountable. Kurt Waltzer, managing director of the Clean Air Task Force (CATF), suggested ways to move forward.

CATF is a nongovernmental organization that advocates for technologies and policies that address environmental and climate needs. Among Waltzer's key points:

- CCUS can be seen as a necessary component to reduce emissions now and in the future, rather than as an enabler for the continued use of oil, coal and natural gas.
- The assurance of safe and permanent storage for CO_2 is fundamental to gaining support from nongovernmental organizations and environmental groups.
- CATF supports the opportunities presented by CCUS, but there is no universal consensus among nongovernmental organizations around CCUS or 45Q.

ANOTHER VIEW FROM REAL LIFE

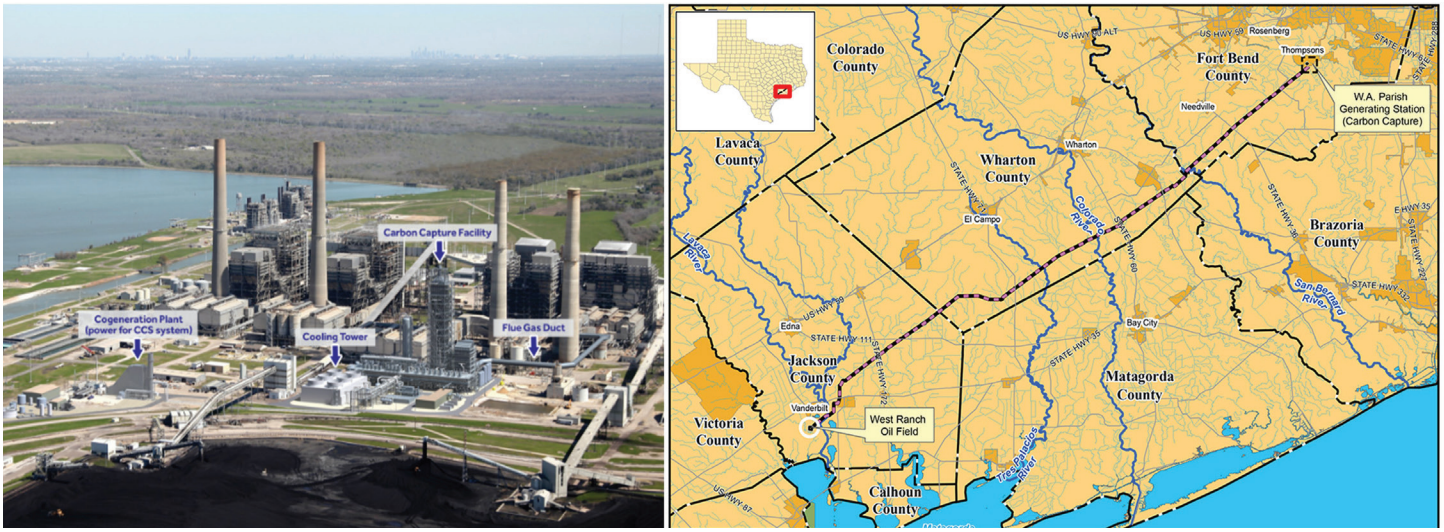
NRG's Petra Nova power plant outside of Houston is capturing CO_2 and delivering it to the oil fields in South Texas. David Greeson, a former NRG executive and project lead for Petra Nova, acknowledged the challenges and shared some of the solutions the company has found.

The PetraNova project captures CO_2 from a coal-fired plant outside Houston, then uses it in South Texas.

According to Greeson, the structure of the Texas electricity market does not reward baseload generation, so carbon-free baseload power must compete with other generation, including that from renewable sources. Renewables are heavily subsidized, causing challenges for baseload coal and natural gas. That's an even greater challenge for a baseload coal or gas plant whose operators want to make the necessary capital investment for carbon capture. To recover the costs, the plant must run – and supply power to the grid – steadily. Ironically, carbon-free renewable generation is intermittent, suggesting the need for a market structure that instead rewards reliable 24/7 carbon-free generation.

The NRG project launched without the benefit of 45Q tax breaks; it did receive funding from DOE, accounting for less than 20% of total capital and startup costs.

Figure 5: PetraNova Carbon Capture Project located near Houston. TX



Source: NRG, 2017.

Key points:

- The uniqueness of a coal-fired power plant producing carbon-free power, available 24/7 without the traditional reliability concerns around other carbon free sources.
- Carbon-free power from fossil fuels should be considered a significant environmental and business opportunity, especially in global markets. The US can develop the technology and knowledge needed and export it to the rest of the world.

CCUS offers tremendous opportunities, but to play a meaningful role in solving the global climate challenge, it must be deployed beyond scattered projects.

Greeson suggested that is not an impossible burden. The technology is commercially available and has been demonstrated as a viable commercial option. The opportunities for successful and permanent storage remain largely untapped.

NEXT STEPS AND ROLE OF CCME AT UH

While there are opportunities for expanding carbon capture and utilization, especially with benefits from a restructured 45Q, it is clear that costs remain high. Some suggested changes to 45Q are detailed in the appendix and pose the opportunity to advance an aggressive path to decarbonize the energy industry.

The potential for increased revenues from EOR will help, as will the expanded role of 45Q, although the provision still has risks that remain unclear. Ongoing work from the National Petroleum Council and the Center for Carbon Management in Energy at UH will offer more insight in the future. The NPC study is expected to be completed by end of the year.

The CCME is dedicated to being a center of excellence for CCUS not only in the US but globally and will be committed to an academic-industry partnership to ensure relevance and impact for the technology, engineering, legal, policy and business fields.

These highlights from the conference offer strong evidence that carbon capture, utilization and storage will play an important role in the coming decades as global focus on reducing emissions grows. Federal tax policy can provide an important boost as technologies, policies and business practices evolve.

The following appendix offers a comprehensive look at the latest iteration of 45Q.

“The potential for increased revenues from EOR will help, as will the expanded role of 45Q, although the provision still has risks that remain unclear.”

APPENDIX

1. Economic Substance Doctrine.

Section 45Q serves an important goal of creating market incentives for private citizens to affirmatively take steps to sequester carbon oxide into secure geological formations. Without such a tax credit, sufficient financial incentives likely would not exist for citizens on their own to engage in such an expensive endeavor. Congress has recognized this fact through its design of section 45Q. For taxpayers who sequester carbon oxide as part of a tertiary recovery operation, Congress expressed a desire to provide a substantial (albeit reduced) amount of section 45Q credit.[5] The taxpayer in the tertiary injection context has sequestered carbon oxide, but at the same time that taxpayer has received another compensating benefit, namely enhanced recovery of oil and gas through the tertiary development operations. So, the amount of the tax credit afforded to the taxpayer under section 45Q is meaningful but objectively much less than the tax credit afforded to taxpayers who sequester carbon oxide in a secure geological formation outside of the tertiary development context.

Said differently, section 45Q provides taxpayers who sequester carbon oxide into a secure geological formation outside of the tertiary recovery context with a much higher tax credit amount.[6] The increased amount of tax credit for carbon sequestration where no tertiary recovery benefits are created makes sense because the sequestration of carbon oxide in the non-tertiary context necessarily means that the taxpayer will receive no anticipated revenue stream from that carbon sequestration activity. Carbon sequestration in the non-tertiary recovery context necessarily means that the taxpayer will incur solely financial costs to capture the carbon and to sequester it as the taxpayer will not receive any offsetting revenue for storing the carbon oxide molecules, given that no enhanced recovery of a commercially marketable product (namely enhanced oil and gas recovery) arises in that context. Thus, the entirety of the financial incentive for engaging in carbon sequestration in the nontertiary scenario arises solely from the tax benefit of the allowable section 45Q credits, and Congress tacitly recognized this fact because it gave a larger tax credit benefit to motivate taxpayers to engage in carbon sequestration in that context and necessarily needed to do so as that activity does not create or produce a marketable product (namely no enhanced oil or gas is recovered in that context). The design of section 45Q, therefore, makes perfect sense in terms of its calibration of the tax credit benefit to motivate taxpayers to engage in activities that promote climate mitigation policies that Congress wants to promote in a broad range of contexts. But even so, section 45Q's unique design features require the Treasury Department and the IRS to carefully consider how section 45Q's goals should be meshed with generally applicable federal tax principles like the economic substance doctrine.

In 2010, Congress codified the judicially created economic substance doctrine through the enactment of section 7701(o).[7] The judicially created economic substance doctrine provides the government with broad authority to disregard the tax benefits derived in transactions that have no economic substance apart from the tax benefits derived from engaging in the transaction.[8] In relevant part, section 7701(o)(1) provides that in the case of any transaction to which the economic substance doctrine is relevant, such transaction shall be treated as having economic substance only if the transaction changes in a meaningful way (apart from Federal income tax effects) the taxpayer's economic position and the taxpayer has a substantial purpose (apart from Federal income tax effects) for entering into such transaction. The above broad-based economic substance doctrine serves a legitimate purpose of preventing tax motivated transactions that frustrate Congress' desires.

But, application of that doctrine in the context of section 45Q would serve to frustrate Congress' desires, not promote them. In this regard, in the context of an allowance of the section 45Q tax credit in the context of nontertiary sequestration as envisioned under section 45Q(a)(3), there is no other derived financial benefit from the carbon sequestration activities apart from the federal income tax credit benefits afforded by section 45Q. The non-tax benefits for engaging in carbon sequestration are benefits derived by the society at large in the form of the positive climate change benefits derived from removing ambient carbon oxide from the atmosphere. This societal benefit is the substantial purpose that Congress sought to further through its enactment

and later expansion of the section 45Q tax credit, but as to the particular taxpayer engaged in the relevant carbon sequestration activity this societal benefit represents "an externality" as the taxpayer receives no direct financial benefit in the nontertiary storage context apart from the allowance of the tax credit for engaging in the carbon sequestration activities.

Thus, an important initial question for an appropriately functioning tax credit under section 45Q relates to when and to what extent will the economic substance doctrine be called upon to disallow tax benefits attributable to carbon sequestration activities that by their very nature are conducted solely to obtain the tax benefits of section 45Q. Section 7701(o)(5)(C) states that the determination of whether the economic substance doctrine were relevant to any particular transaction is to be made in the same manner as if section 7701(o) had never been enacted. Thus, if the economic substance doctrine was not relevant to a particular activity or investment prior to the enactment of section 7701(o), the IRS has recognized that it is still not relevant after the enactment of section 7701(o).[9]

Nevertheless, at present, the government has stated that the determination of when to apply the economic substance doctrine is to be done on a case-by-case basis, depending on the facts and circumstances of each individual case.[10] Moreover, the IRS has a ruling policy that it will not provide private rulings on the question of whether or to what extent the economic substance doctrine is relevant to a particular transaction.[11] Thus, at present, taxpayers who cannot meet the profit-motivation safe harbor indicated in section 7701(o)(2) are left with a significant level of uncertainty as to the manner and the extent to which the economic substance doctrine might be used to disallow tax credit benefits derived from carbon sequestration activities when the tax benefits of those activities are the principle reason the taxpayer was motivated to engage in carbon sequestration in the first place. In thinking about this issue, the Treasury Department and the IRS need to ensure that the application of generally applicable tax principles like the economic substance doctrine do not frustrate the goals of section 45Q or else taxpayers will not obtain the tax benefits that are necessary to motivate them to engage in the positive climate change mitigation efforts that Congress seeks to motivate them to conduct.

The Treasury Department and the IRS, therefore, need to provide guidance to indicate that the economic substance doctrine is not relevant to activities that are conducted under the auspices of section 45Q and then need to state that the generally applicable economic substance doctrine would not be used as a basis to disallow the availability of tax credits otherwise allowable under section 45Q. Clarity is needed because the economic substance doctrine is an otherwise far-reaching doctrine that if applied to the section 45Q context would frustrate the Congressional intent to provide an explicit tax subsidy to motivate private citizens to engage in carbon sequestration activities that would not otherwise be pursued "but for" the allowance of the section 45Q tax credits. The legislative history to section 7701(o) provides significant support for the Treasury Department to provide the clarity along the lines advocated in this comment letter as the following explanation of the relevance of the economic substance doctrine makes plain:

> If the realization of the tax benefits of a transaction is consistent with the Congressional purpose or plan that the tax benefits were designed by Congress to effectuate, it is not intended that such tax benefits be disallowed. . . Thus, for example, it is not intended that a tax credit (e.g., section 42 (low-income housing credit), section 45 (production tax credit), section 45D (new markets tax credit), section 47 (rehabilitation credit), section 48 (energy credit), etc.) be disallowed in a transaction pursuant to which, in form and substance, a taxpayer makes the type of investment or undertakes the type of activity that the credit was intended to encourage.[12]

Section 45Q is not listed in the above non-exhaustive list of examples of where Congress' desire to promote some other policy goal would be subverted by the application of the economic substance doctrine. But, section 45Q provides an even clearer case for not applying the economic substance doctrine than several of the illustrative areas cited in the legislative history to section 7701(o) because section 45Q(a)(3) provides a tax benefit for an activity where no other financial gain is posited to exist apart from the tax credit

> "Congress' allowance of a higher tax credit in the context of carbon sequestration into a non-tertiary formation provides tangible evidence of Congress' desire to motivate taxpayer behavior even when there is no other financial benefit in the carbon capture and sequestration context."

benefits, and so this reality makes section 45Q a unique provision to which general tax principles must recognize as exceptional.

Guidance is needed in regulations because recent private rulings issued by the IRS evidence a reluctance by the agency to disclaim the relevance of the economic substance doctrine in situations where Congress' goals would seem to be frustrated by its application. In this regard, the IRS has on multiple occasions reserved on the issue of whether investments that generate tax benefits under the analogous area of section 45 implicated the economic substance doctrine even though section 45 is cited as an illustrative example for where the economic substance doctrine should not be applicable.[13] The IRS's refusal to rule on the applicability or nonapplicability of the economic substance doctrine was left unexplained in those private rulings, and that's a problem. Consequently, in the context of this current regulatory project, the Treasury Department and IRS need to explicitly make clear that Congress' desire to encourage carbon sequestration activities solely or principally for tax reasons is what Congress envisioned and so by necessity the economic substance doctrine is inapplicable to activities conducted under the auspices of section 45Q. Again, Congress' allowance of a higher tax credit in the context of carbon sequestration into a non-tertiary formation provides tangible evidence of Congress' desire to motivate taxpayer behavior even when there is no other financial benefit in the carbon capture and sequestration context. Thus, given this reality, the economic substance doctrine cannot be applied in the carbon sequestration context as doing so would frustrate Congress' goal of using the tax system to provide the principal or sole financial incentive for taxpayers to engage in the carbon sequestration activities that otherwise would not be financially viable apart from the tax benefits.

Thus, forthcoming guidance by the Treasury Department should indicate that taxpayers who make investments in carbon capture equipment and then use that carbon capture equipment to sequester the captured carbon oxide will be entitled to a tax credit under section 45Q and will be treated as being engaged in the active conduct of a trade or business regardless of whether or not those carbon sequestration activities ever generate a financial profit apart from the tax benefits derived from the tax credit allowed under section 45Q. In order for Congress' goals to promote carbon sequestration to be realized, forthcoming regulations should make plain that the ongoing cost associated with the conduct of these carbon sequestration activities should be deductible under section 162 and then should make plain that the ability to claim a tax credit under section 45Q will not be disallowed by reason of the economic substance or business purpose doctrines as long as those carbon capture and sequestration activities are actively conducted in the manner Congress desired to promote through the enactment of section 45Q. Applying the business purpose doctrine and the economic substance doctrine in the context of carbon sequestration activities would frustrate the fundamental policy goals that section 45Q was designed to promote.

2. Secure geological storage.

For both section 45Q(a)(3) and (4), the captured carbon must be sequestered into a secure geological formation. Section 45Q(f)(2) provides that the Treasury Department, in consultation with the Administrator of the Environmental Protection Agency, the Secretary of Energy, and the Secretary of the Interior, shall establish regulations for determining adequate security measures for the geological storage of qualified carbon oxide. In furtherance of that regulatory directive, Sec. 3.01 of Notice 2019-83 specifically asked for comments on two matters:

- Are there technical criteria different from or in addition to those provided in the EPA's GHGRP that should be used to demonstrate secure geological storage? Are there existing guidelines, standards, or regulations that could be used to demonstrate secure geological storage such as those developed by the International Organization for Standardization (ISO)?
- Should EPA's GHGRP rules continue to be the reporting requirements for purposes of § 45Q, and should an approved MRV Plan from the EPA be received before any §45Q credit can be claimed? Are there any viable alternatives to the subpart RR reporting requirements, such as third party, Department of Energy, or State certification?

As to the first bulleted item, we believe that the government should be open to standards developed by the International Organization for

Standardization.[14] We believe that the IRS and EPA should not foreclose the opportunity to be certified by a nongovernmental organization such as ISO.

However, the caution we would like to provide to the Treasury Department and the IRS is that the science is quickly evolving in this arena. Significant discoveries and learning are occurring in terms of carbon sequestration and carbon capture. As a result, any regulatory guidance in this area should not be static and should recognize that best practices and standards are going to evolve. Given this reality, forthcoming regulations should allow certification of a formation as "geologically secure" under safe harbor provisions but then should provide a means to satisfy that criteria under a facts and circumstances test through certification by the EPA, an appropriate state government authority, or through a rigorous nongovernment organization such as the ISO certification process. The regulatory grant of authority under section 45Q(f) is broad, and the Treasury Department should exercise its broad authority under section 45Q(f) to ensure that its regulations provide clarity on what will be considered a secure geological formation but then provide a facts and circumstances test that could be utilized for potential future developments.

As to the second bulleted item, we recognize that the Treasury Department has a legitimate concern that adequate proof should exist that the sequestered carbon oxide has been appropriately secured before a tax credit is allowable under section 45Q. The Treasury Department also is right to understand that other agencies or nongovernmental organizations are likely better positioned to address the specific technical issues related to whether the captured carbon molecules have been stored in a secure geological formation. However, even though the Treasury Department and the IRS need administrable regulations on issues outside of its areas of particular expertise, the regulations nevertheless should take a balanced approach. As long as adequate proof of sequestration into a secure geological formation exists, then the Treasury Department should not bar the allowance of a tax credit under section 45Q simply because of a procedural foot fault when the taxpayer has complied with the substantive directive to which section 45Q is aimed.

Thus, we believe that the government's disallowance of section 45Q tax credits in the fact pattern set forth in FSA 20183701f (May 3, 2013) is overly harsh if the facts in that ruling were such that the taxpayer could have demonstrated that the carbon dioxide had been sequestered into a secure geological formation. The fact that EPA had not pre-approved the taxpayer's sequestration plan as of the time of the taxpayer's filing of its tax return represents a "foot fault" that by itself should not bar the allowance of tax credits under section 45Q. To state that such proof must exist as of the time of the taxpayer's filing of the original tax return represents a procedural trap for the unwary that frustrates the legitimate goals of ensuring that a tax credit is provided to those taxpayers who in fact have substantively engaged in the activity that Congress desired to promote, namely the capture and sequestration of carbon oxide so that it does not become ambient. The intent of the statute and the public policy goal is to ensure that sequestered carbon oxide is placed in a secure geological formation. Certainly, confirmation from an agency with appropriate oversight should be obtained. However, conditioning the availability of the tax credit afforded under section 45Q upon the pre-approval by the EPA sets forth an extra compliance hurdle that potentially limits the tax credit benefits to taxpayers who have engaged in the activity that Congress desires to promote.

In our view, forthcoming regulations should provide a safe harbor that indicates that pre-approval from the EPA of the taxpayer's carbon sequestration plan and compliance with that pre-approved plan would provide certainty that the taxpayer's activities are compliant with section 45Q's substantive requirements, but that should not be the sole means of demonstrating compliance. Absent prior EPA approval of the taxpayer's carbon sequestration plan, the taxpayer should have the burden of proof to demonstrate that its captured carbon was sequestered into a secure geological formation under a facts and circumstances analysis. In this regard, the taxpayer should be given an opportunity to have a fact-finding by the EPA, state agency, or relevant nongovernmental agency to determine whether its carbon oxide molecules have been appropriately stored in a secure geological formation. If the taxpayer can satisfy this burden of proof under a facts and circumstances analysis that relies on the expertise of another agency, then the taxpayer

should be afforded with an opportunity for such a determination as doing so allows the taxpayer the opportunity to claim the tax benefits that Congress intended to provide.

3. Recapture of Tax Credit.

Pursuant to section 45Q(f)(4), taxpayers must recapture the benefit of any credit allowable under section 45Q(a) with respect to any qualified carbon oxide that ceases to be captured, disposed of, or used as a tertiary injectant in a manner consistent with the requirements of section 45Q.

In Sec. 3.02 of Notice 2019-32, the government asks for comments on the applicable standard that should be utilized to determine whether and to what extent a tax credit should be recaptured. In addition, the government asked for comments specifically on rules for the determination of whether a formation is a secure geological storage when carbon oxide is used as a tertiary injectant.

In our view, the recapture period should simply be the normal period for the statute of limitations for a tax return plus any extensions.[15] The existing limitations period that generally applies to tax returns already provides an appropriate balancing of interest between the taxpayer's desire for repose and the government's need for ensuring appropriate enforcement.

In terms of the standards for determining recapture, we note that the EPA is charged with oversight that includes the ongoing monitoring, reporting, and validation over whether carbon oxide has been captured and for determining whether the sequestered carbon oxide has ceased to be securely stored. Thus, the IRS should look to the EPA or, where appropriate, to a state agency charged with oversight over such facilities. The EPA or appropriate state agency with oversight over these formations should provide safe harbor guidance on the anticipated amount of carbon oxide that is likely to be re-released back into the atmosphere in a tertiary development project. Thus, once the EPA has certified that a formation is a secure formation and provided guidance on what amount of carbon oxide molecules is likely to be re-released in the context of tertiary activities, then that determination should be presumptively accepted pending contrary evidence provided either by the taxpayer, the EPA, or state agency that exercises oversight over the sequestration of carbon oxide.

However, notwithstanding the above safe harbor, the taxpayer should be able to provide scientific evidence to either the EPA or appropriate state regulatory agency to demonstrate that the amount of carbon oxide that has actually been re-released is less than what the EPA safe harbor guidelines anticipated for the taxpayer's tertiary activities. Thus, in our view, the regulations should provide a safe harbor to which taxpayers can rely and then provide a mechanism for taxpayers to demonstrate that the actual carbon oxide release was in fact lower than the safe harbor threshold.

4. Definition of Terms: Carbon Capture Equipment and Qualified Facility.

In Sec. 3.03 of Notice 2019-32, the government asked whether guidance is needed to further clarify terms and definitions appearing in section 45Q, such as carbon capture equipment, qualified carbon oxide, direct air capture facility, qualified facility, tertiary injectant utilization, or lifecycle greenhouse gas emissions.

We believe that clarification of these terms would be beneficial to both taxpayers and the government. In particular, the government should clarify the definition of "qualified facility" and "carbon capture equipment." A "qualified facility" is the industrial facility that is the source of the qualified carbon oxide and will often be owned by a party that is different from the taxpayer that will own the "carbon capture equipment." The IRS definition should understand that there is likely to be many different types of facilities and that facilities may have been retrofitted over time. The government should then make clear that the relevant party entitled to claim a tax credit under section 45Q is the taxpayer who owns the carbon capture equipment whether or not that party owns the qualified facility that emitted the carbon oxide.

5. Party Entitled to the Credit.

The reality for many arrangements is that multiple parties will be involved in the carbon sequestration process. Except in the case of the largest companies, it is likely to be the case that a carbon sequestration activity will include differing parties that perform one or more of the following functions: (a) one party will emit the carbon oxide at a qualified facility, (b) another party will invest in carbon capture equipment at that facility and will

separately own and operate that carbon capture equipment to capture carbon oxide molecules (hereafter referred to as the "Carbon Capture Partnership"), (c) a different party may agree to transport the sequestered carbon oxide molecules through its pipeline to a storage facility, and (d) a final party may own a storage facility and will take custody over the transported captured carbon oxide molecules and then inject those molecules into a secure geological formation.

Throughout each of these steps in the carbon capture and sequestration supply chain, contractual arrangements will likely exist that set forth the performance obligations of each party and the representations and warranties for each party in terms of its duty of care for ensuring that the captured carbon oxide molecules are not re-released back into the atmosphere. Investors into the entity that owns the carbon capture equipment may well be financial investors that provide the capital for the activities performed by the Carbon Capture Partnership but otherwise may be passive partners. Ownership of the carbon oxide molecules may well pass from the Carbon Capture Partnership to the next party in the supply chain indicated above. In other arrangements, the carbon oxide molecules may remain owned by the Carbon Capture Partnership throughout the transportation and/or injection process and the role of intervening parties may simply be to act as agents with respect to the transport and injection of the carbon oxide molecules for and on behalf of the Carbon Capture Partnership. And, with respect to the carbon oxide molecules that are transported to the injection site, the carbon oxide molecules may be commingled with other carbon oxide molecules that were captured elsewhere by a different Carbon Capture Partnership, and this commingling would necessarily occur if the carbon oxide molecules are placed into a common carrier pipeline for transportation to a common disposal site.

Forthcoming regulatory guidance needs to be nuanced enough to envision these expected and recurring business complexities but at the same time must also be transparent enough to be administrable for taxpayers and the government.

In Sec. 3.06, 3.07, and 3.09 of Notice 2019-32, the government requested comments on the following:

> .06 Under § 45Q(f)(3)(A), the credit is attributable to the person that captures and physically or contractually ensures the disposal, utilization, or use of the qualified carbon oxide as a tertiary injectant. The Treasury Department and the IRS seek comments on the types of contractual arrangements that investors anticipate with parties who capture or dispose or utilize qualified CO. What are common terms of contracts ensuring the disposal, utilization, or use of qualified CO as a tertiary injectant? What should result if such terms are determined to be insufficient?
>
> .07 What factors should be considered in determining the time and manner of the election under § 45Q(f)(3)(B) to transfer the § 45Q credit to a person that disposes of the qualified carbon oxide, utilizes the qualified carbon oxide, or uses the qualified carbon oxide as a tertiary injectant? If such an election is made, what issues should be considered regarding the transfer of the § 45Q credit?
>
> .09. Is guidance needed concerning structures in which project developers and participating investors would be respected as partners in a partnership generating a § 45Q credit? Further, is guidance needed on allocating the credit and recapture of the credit among the partners in a partnership?

We view each of the above three requests as presenting a common issue of what substantive requirements must be satisfied for a taxpayer to be entitled to the tax credit allowed under section 45Q, and so forthcoming guidance should designate one party in these complex supply chains that by default is entitled to the benefits of the tax credit afforded by section 45Q. We recognize that the government needs clear rules so that multiple parties do not submit competing claims of entitlement over the same section 45Q tax credit for the sequestered carbon oxide molecules. We also recognize that several parties in this supply chain have contributed significantly towards the ultimate sequestration of the capture carbon oxide molecules.

In our view, we believe that the government should provide clear guidance starting with when an investor into the Carbon Capture Partnership will be respected as a true partner and then

extends that guidance to identifying which party in the entire carbon sequestration supply chain is entitled to claim the section 45Q credits. We believe that such guidance should follow the below framework.

First, as to an investor's right to claim an allocable share of tax credits as a partner in a Carbon Capture Partnership that invests and operates carbon capture equipment, the government needs to provide guidance on when it will respect that financial investor's role as a partner in the Carbon Capture Partnership and when the government will claim that the financial investor is not entitled to be treated as a partner in the Carbon Capture Partnership. To begin with, there is a concern about whether a tax partnership can exist when no expected revenue is going to be generated from the Carbon Capture Partnership's activities. For situations where carbon capture equipment is constructed and operated and the eventual disposition of the sequestered carbon is into a nontertiary formation, the Carbon Capture Partnership will make capital investments into carbon capture equipment and then will incur costs to operate that equipment and then will likely have to pay other counterparties for the cost of transporting and disposing of the captured carbon oxide molecules. The Carbon Capture Partnership may have no revenues from these operations in the context envisioned by section 45Q(a)(3). The only financial benefit derived from the Carbon Capture Partnership in the nontertiary context is again solely the tax credits allowable under section 45Q.

The Supreme Court has indicated that the existence of a partnership for tax purposes depends upon a consideration of all of the facts and circumstances and a determination of whether the parties acted in good faith and with a business purpose to join together to conduct the business of the enterprise.[16] Unfortunately, the determination of whether a valid partnership arrangement exists is one where the courts have used differing tests.[17] For the government's part, the IRS has announced a fifteen factor test for determining whether a partnership is one that would be respected for tax purposes.[18] What is more, the Treasury Department has broad authority to disregard partnership transactions that violate the goals and purposes of subchapter K.[19] The government therefore needs to provide guidance on how a partnership that incurs only costs and does not expect to generate positive revenue nevertheless would be deemed to be a valid partnership that is engaged in an ongoing business for the purpose that Congress designed it to conduct. Congress wants to create a market for carbon capture activities and not simply apply a tax regime on an existing market that exists for nontax reasons. In important instances, section 45Q is attempting to create a market where none existed before. This reality has profound implications as to the manner in which general tax principles are to be applied in the unique context of section 45Q.

Second, as an additional issue, the government should also define what level of risk is necessary for an investor to possess in order to be respected as a partner in a Carbon Capture Partnership. In this guidance, the government needs to recognize that the Carbon Capture Partnership will receive contractual protections from the downstream counterparties who take over responsibility for transporting and disposing of the captured carbon oxide molecules and for its injection into a secure geological formation. Those contractual protections may also provide indemnity protection if the downstream counterparty fails to act in accordance with their contractual obligations. Those contractual arrangements may also include audit and inspection rights along with the right to receive documentation to indicate that the carbon oxide molecules were properly sequestered into a secure geological formation.

The government's successful litigation in *Historic Boardwalk Hall, LLC v. Commissioner*[20] creates concern over what residual partner-level risk must exist for an investor to be considered a partner in a partnership that conducts activities entitled to obtain a tax credit. In *Historic Boardwalk Hall, LLC v. Commissioner*, the government successfully disallowed rehabilitation tax credits otherwise allowable under section 47 that had been allocated to an investor in a partnership because the court found (at the government's urging) that the particular investor (Pitney Bowes) lacked a meaningful stake in either the success or failure of the underlying partnership activities and thus was not a bona fide partner in that endeavor; thus even though the underlying partnership had engaged in the rehabilitation activities that were intended to be incentivized by Congress, the benefits of the section 47 rehabilitation tax credits

were disallowed as the investor in that partnership had simply purchased tax credits and was not a bona fide partner with business risk. The IRS has cited its victory in *Historic Boardwalk Hall* as a basis to disallow monetization structures utilized in the context of section 45 production credits, claiming that the monetization strategies that were posited in the rulings had crossed a line so as to cause the investor to not be viewed as a partner with business risk but simply as an investor who had attempted to purchase tax credit benefits.[21] The investor, according to the government's audit position in those rulings, must be in form and substance a partner with an appropriate interest in the partnership's business activities in order to be entitled to claim the tax credits.

The government's victory in *Historic Boardwalk Hall* had a chilling effect on the tax credit market,[22] and so the IRS in Rev. Proc. 2014-12 provided a safe harbor for when it would not contest an outside investor's entitlement to claim tax credits as a partner in a partnership that conducts the credit-eligible activities.[23] Given that the government has already asserted that its litigating position in *Historic Boardwalk Hall* would be applicable to investors that seek tax credits outside the context of the tax credits that were the subject of that particular litigation, the Treasury Department should expand its safe harbor guidance set forth in Rev. Proc. 2014-12 to provide specific safe harbor guidance for section 45Q so that a partner's status as a partner in a Carbon Capture Partnership is respected and the allocation of tax credits to that partner would not be challenged. As part of that expanded guidance, in terms of making this safe harbor applicable to carbon sequestration, the government should provide affirmative guidance on what contractual protections can exist between the Carbon Capture Partnership and a party that is obligated to assume responsibility for transporting the captured carbon oxide and then to dispose of it into a secure geological formation. Specifically, the IRS should affirmatively state that a prohibited guarantee does not exist if the party responsible for disposing of the carbon oxide warrants that it did in fact dispose of the carbon oxide in a secure geological formation and agrees to indemnify the Carbon Capture Partnership if the EPA or another appropriate agency contests that determination. In a vast number of scenarios, it is unlikely to be the case that the Carbon Capture Partnership will own a secure geological formation. Thus, in many situations, the Carbon Capture Partnership will ask for assurances that the party that will inject the carbon oxide molecules does in fact own a secure geological formation. Contractual representations, warranties, and indemnities with respect to the status of the formation should not create a concern under Historic Boardwalk Hall, and forthcoming regulations should make this point plain.

Third, in terms of which party should be entitled to claim the benefits of section 45Q, we believe that forthcoming regulations should provide a default rule that the owner of the carbon capture equipment is the appropriate party to claim the tax credit under section 45Q. However, forthcoming regulations should allow the Carbon Capture Partnership to elect to transfer or assign some or all of the section 45Q credit in whole or in party to another party in the carbon capture supply chain if both parties make a joint election that is binding on both parties. The IRS should develop a form that would be attached to the tax returns of both parties that would set forth how the tax credit would be claimed by each of the parties, and the parties should be bound by the allocation set forth in the joint form. The joint filing of duplicate forms with tax returns of both of the relevant taxpayers would provide the IRS with the means to confirm that the transfer of any section 45Q credit to the other party was appropriate and each party consistently reports its share of the tax credits in accordance with the joint election. In our view, this assignment of credit should be an annual election. But importantly, absent a joint election to which the Carbon Capture Partnership joins in making, the Carbon Capture Partnership should be designated as the party that would be entitled to the full amount of the section 45Q credit under the default rule.

The above default rule and election procedure, in combination, would ensure that the Carbon Capture Partnership would be entitled to claim the tax credit allowable under section 45Q. The above framework would provide certainty under the default rule that the partners in the Carbon Capture Partnership would not be disgorged of the section 45Q credit absent the consent of the Carbon Capture Partnership. The ability to assign a portion of the section 45Q credits would allow other parties in the supply chain to obtain value for their participation and contribution without requiring that compensation to be in the form

> "To be eligible for the section 45Q benefits, taxpayers must commence construction on qualifying projects before January 1, 2024."

of cash. But having said all of this, the above framework also provides a clear and administrable framework for determining the party entitled to the credit and provides a mechanism to ensure that parties take consistent tax positions with respect to their share of the tax credit.

6. Beginning of Construction.

To be eligible for the section 45Q benefits, taxpayers must commence construction on qualifying projects before January 1, 2024. In Sec. 3.08 of Notice 2019-32, the government asks whether guidance is needed on what constitutes beginning of construction.

The Treasury Department and the Service have published extensive guidance on what constitutes the beginning of construction of a qualified facility under section 45(d). In the context of section 45(d), the government provided two tests for determining when construction of a qualified facility has begun.[24] Under the first test, the beginning of construction can be commenced by beginning physical work of a significant nature (Physical Work Test). Alternatively, under the second test, a taxpayer may establish the beginning of construction by meeting the safe harbor provided (Five Percent Safe Harbor). Both methods require that a taxpayer make continuous progress towards completion once construction has begun (Continuous Construction Test). In the section 45(d) context, the government supplemented these tests with a safe harbor (the Continuity Safe Harbor) that addresses what level of continuous activity must be met in order for construction to be viewed as ongoing.[25] In 2014, the government provided further clarifications to the Physical Work Test.[26] And, in 2015, the government extended the period for the Continuity Safe Harbor by an additional year.[27] Also in 2016, the government further modified the Continuity Safe Harbor and the Physical Work Test and provided that the Continuity Safe Harbor Test would be presumptively met if a facility is placed in service by the calendar year that is no more than four calendar years after the calendar year during which construction of the facility began.[28] In 2017, the government further modified the guidance it provided as to the Continuity Safe Harbor and modified other guidance as well.[29]

The above brief review of the government's guidance in the section 45(d) context demonstrates that the government has already expended considerable effort to set forth what constitutes the beginning of construction in an analogous tax credit situation. In our view, forthcoming regulations should simply rely on that existing guidance and extend that guidance to the section 45Q context. We commend the government for the diligence and detailed work it has already incurred in order to provide helpful and clear guidance for taxpayers.

However, we do note two areas where section 45Q should have differing guidance. In our view, the Continuity Safe Harbor should envision a longer period of time than just the four-year period specified in Notice 2016-31 when applied to section 45Q projects. The development of carbon sequestration equipment is ongoing and evolving, and prototypes are being developed and tested. Depending on the type and nature of the carbon capture equipment, these installation projects may be more extensive and require a longer construction period than would normally exist for a project contemplated under section 45(d). Thus, we would encourage the government to allow for a longer presumptive period under the Continuous Safe Harbor Test for a project constructed under the auspices of section 45Q than is currently envisioned in the section 45(d) guidance. As a second point, we think that the Continuity Safe Harbor Test should contemplate that a delay in a project due to the lack of an immediately available pipeline connection should be an excludible disruption in the context of a section 45Q project.[30] Carbon capture equipment will need to be connected to a pipeline that is capable of transporting the captured carbon oxide molecules to an injection site. The timing for construction and completion of pipelines might be subject to unexpected delays due to permitting and other matters that are outside the control of the entity that invests in the carbon capture equipment. Section 4.02 of Notice 2016-31 contemplates various excludible disruptions, and that guidance should be expanded to include delays or disruptions in construction caused due to the lack of an immediately available pipeline connection.

FOOTNOTES

1 – See enacted by § 115 of the Energy Improvement and Extension Act of 2008, Division B of Pub. L. No. 110-343 , 122 Stat. 3765, 3829 (October 3, 2008).

2 – See § 1131 of the American Recovery and Reinvestment Tax Act of 2009, Division B of Pub. L. 111-5 , 123 Stat 115 (February 17, 2009).

3 – See § 41119 of the Bipartisan Budget Act of 2018, Pub. L. No. 115-123 (February 9, 2018).

4 – See §45Q(f)(6).

5 – See §45Q(a)(4); §45Q(b)(1)(A)(i)(II). The IRS provided set forth a table for the amount of the credit applicable to each year for purposes of section 45Q(a)(4) in Notice 2018-93, Sec. 3, 2018-51 I.R.B. 1041. The amount so established by year is also subject to indexation for inflation after 2026. See §45Q(b)(1)(A)(ii)(II).

6 – See §45Q(a)(3); §45Q(b)(1)(A)(i)(I). The IRS provided set forth a table for the amount of the credit applicable to each year for purposes of section 45Q(a)(3) in Notice 2018-93, Sec. 3, 2018-51 I.R.B. 1041. The amount so established by year is also subject to indexation for inflation after 2026. See §45Q(b)(1)(A)(ii)(I).

7 – For an more in depth consideration of the codification of the economic substance doctrine and its impact on the decided case law, see Bret Wells, Economic Substance: How Codification Changes Decided Cases, 10 FLORIDA TAX REV. 411 (2010).

8 – See e.g., See Coltec Indus., Inc. v. United States, 454 F.3d 1340 (Fed. Cir. 2006).

9 – See Notice 2010-62, 2010-40 IRB 411.

10 – See Notice 2014-58, 2014-44 I.R.B. 746.

11 – See Rev. Proc. 2019-3, Sec. 3.02, 2019-1 IRB 130.

12 – See Staff of the Joint Committee on Taxation, Technical Explanation of the Revenue Provisions of the "Reconciliation Act of 2010," as Amended, in Combination with the "Patient Protection and Affordable Care Act" (JCX-18-10, 2010), at 152, n.344.

13 – See PLR 20110500 (Feb. 4, 2011) (IRS refused to rule on whether or to what extent the economic substance doctrine was implicated by the taxpayer's investment in refined coal investment project that was eligible for tax credits under section 45(c)(7)); PLR 201105006 (Feb. 4, 2011) (same); PLR 201105002 (Feb. 2, 2011) (same).

14 – See International Organization for Standardization, Carbon dioxide capture, transportation and geological storage — Carbon dioxide storage using enhanced oil recovery (CO2-EOR), ISO/FDIS 27916 (2018).

15 – See §6501(a).

16 – See Commissioner v. Culberton, 337 U.S. 733 (1949).

17 – See Bradley T. Borden, The Federal Definition of Tax Partnership, 43 HOUS. L. REV. 925 (2006).

18 – See Rev. Proc. 2002-22, 2002-1 C.B. 733.

19 – See Treas. Reg. §1.701-2.

20 – See Historic Boardwalk Hall, LLC v. Comm'r, 694 F.3d 425, 462–63 (3d Cir. 2012).

21 – See TAM 201729020 (July 21, 2017) (concluding that the parties structured a financial transaction in which Taxpayer facilitated the improper sale of §45 tax credits to an investor with the consequence that the Investor was not entitled to claim the tax credits arising from partnership's activity).

22 – See Richard M. Lipton, New Rehabilitation Credit Safe Harbor—Limiting Historic Boardwalk Hall, 120 J. Tax'n 128 (March 2014).

23 – See Rev. Proc. 2014-12, Sec. 4, 2014-1 C.B. 415.

24 – See Notice 2013-29, 2013-1 C.B. 1085.

25 – See Notice 2013-60, 2013-2 C.B. 431.

26 – See Notice 2014-46, 2014-2 C.B. 520.

27 – See Notice 2015-25, 2015-1 I.R.B. 814.

28 – See Notice 2016-31, 2016-1 C.B. 1025.

29 – See Notice 2017-04, 2017-4 I.R.B. 541.

30 – See Notice 2016-31, Sec. 4.02, 2016-1 C.B. 1025.

About the Center for Carbon Management

CCME

The Center for Carbon Management in Energy (CCME) is a collaboration across UH led by the UH Law Center and UH Energy that has the capability and capacity at the University of Houston to meet the lower carbon future energy transition challenges. Multi-disciplined, collaborative research from the required fields of engineering and science, business, law, public policy, as well as education for the marketplace, will be strategically aligned with our industry advisory board to address the needs of oil and gas, petrochemicals, and electric power markets. The principal investigators for the CCME are Ramanan Krishnamoorti and Tracy Hester.

The CCME will engage directly with these marketplace challenges to reduce carbon emissions that impact the climate and in doing so provide an accretive pathway for investment in the energy transition. We believe we are uniquely situated in Houston, aligned with our university energy advisory members, and purposely linked to global external collaborators, to impact the marketplace and provide the required solutions for the future.

CCME

Center for Carbon Management in Energy