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Energy

INSIGHT: Return on Investments in Climate Technologies

Dr. Siegmair Pohl and George Schutzer of Squire Boggs Patton discuss whether the enhanced 2018 U.S. tax credit made emission negative carbon capture technologies viable.



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Climate technologies have long been frowned upon as not being financially viable and as scientifically risky. Climate technologies aim at halting climate change, for example, by producing “negative emissions” by way of carbon dioxide reduction and capturing. This paradigm may have begun to shift. In their 2014 report on climate change, the Intergovernmental Panel on Climate Change (IPCC) found that almost all of the more than 100 scenarios it studied to keep the increase of the planet’s temperature under 2 degrees Celsius involved negative emissions.

The United Nations Environmental Program stated in its 2017 annual Emissions Gap Report that, in order to achieve the goals of the Paris Agreement on Climate Change, carbon dioxide removal is likely a necessary step. In addition, two other developments will have a significant practical and economic effect. First, initiatives by the private sector investing in climate technologies have gained momentum. Second, the Bipartisan Budget Act of 2018 significantly expands and enhances the tax credit under tax code Section 45Q. The tax credit incentivizes the capture and transport of carbon dioxide from an industrial source for use in enhanced oil recovery or for permanent storage in a geologic for-

mation (see Section 41119 of Pub. Law 115-123, the Bipartisan Budget Act of 2018).

I. INITIATIVES OF THE PRIVATE SECTOR INVESTING IN CLIMATE TECHNOLOGIES

When it became clear that fighting climate change was not going to be on the agenda of the current legislature and administration, the private sector took initiative. Part of the motivation probably is the huge economic potential of this new industry. Insiders, including Adrian Corless, Chief Executive of Carbon Engineering, believe that if a business can be built around carbon removal, we would be looking at trillion-dollar markets.

A. Industry Groups and Funds Notably, 10 major oil and gas companies (BR Petrobras, BP, Saudi Aramco, Repsol, Shell, PEMEX, CNPC, ENI, StatOil, and Total) formed the Oil and Gas Climate Initiative (OGCI) in London. The group’s mission is to be a catalyst for change in the direction of the Paris Agreement. It aims to intensify the initiatives of the member companies to reduce the greenhouse gas footprint of the core oil and gas business—and to explore new businesses and technologies. In 2016, OGCI launched a billion-dollar investment vehicle, Climate Investments. Together with its global network of co-investors and partners it invests in technologies that have the potential to significantly reduce greenhouse gas emissions, are economically viable and ready to be commercialized. In February 2018, it invested 7 million pounds in Econic Technologies in London, which develops new catalysts and processes for the manufacture of polymers from carbon dioxide. Climate Investments hosts an annual climate investments venture day, where \$20 million are invested in technologies and solutions and that are deployed in collaboration with OGCI’s member companies and their

partners. In 2017, the venture day focussed on carbon dioxide capturing technologies.

Also, a group of the world's wealthiest individuals formed the Breakthrough Energy Coalition. Bill Gates (Microsoft), Jeff Bezos (Amazon), Richard Branson (Virgin Group), Jack Ma (Alibaba), Meg Whitman (Hewlett Packard), Mark Zuckerberg and Dr. Priscilla Chan (Facebook), the OCGI, and others have reportedly provided billions of dollars for research in new energy technologies. The coalition has formed Breakthrough Energy Ventures (Kirkland, Wash.), an investor-led private equity fund with the mission to enable everyone on the planet to enjoy a good standard of living, including basic electricity, healthy food, comfortable buildings, and convenient transportation, without contributing to climate change. Its strategy links cutting-edge, government-funded research to patient, risk-tolerant capital so that more clean energy innovations get to market faster. The fund would finance emission negative and other new energy technologies.

Amazon.com Inc. recently launched a grant-making program with the University of Washington called Amazon Catalyst to fund "bold, globally impactful, disruptive" projects that address complex issues such as climate change. The grants, ranging from \$10,000 to \$100,000, are open to all disciplines.

Carbon X Prize (Culver City, Calif.) is a \$20 million global competition that challenges teams to develop innovative technologies to convert CO emissions from power plants and industrial facilities into useful products such as building materials and alternative fuels.

B. Emission Negative Technologies of Individual Companies In addition to these industry groups and funds, individual companies are developing emission negative climate technologies. Some of them focus on carbon capturing from the air (direct air capture), and some are advancing technologies that capture carbon before it can disperse into the air, for example at a power station, steel mill, or a cement plant. The latter process is called carbon capture and storage, sometimes referred to as carbon capture and sequestration (CCS). Capturing carbon dioxide at a plant can consume a lot of energy and—without other incentive—is obviously more costly than simply releasing it in the air. A variation of CCS is BECCS which means "bio-energy with carbon capture and storage" which uses photosynthesis to suck up carbon dioxide.

Climeworks (Switzerland) is one on the few companies pursuing carbon capture from the air. In May 2017, Climeworks set up its first commercial unit near Zurich capturing about 1,000 metric tons of carbon dioxide from the air each year (equivalent to 20 U.S. households' annual emissions). The captured carbon dioxide is supplied to a nearby greenhouse, where a high concentration of the gas boosts crop yield by 20 percent. In October 2017, at a geothermal power plant in Iceland, Climeworks implemented the first direct-air-capture system that verifiably achieves negative carbon emissions. Although still at pilot scale, it is the first true negative emissions plant—the first system to convert the emissions into stone to ensure they do not escape back into the atmosphere for the next millions of years.

Global Thermostat (New York) appears to be the first U.S. company to remove carbon dioxide from the air. The concept is to supply cheaper carbon dioxide to businesses that use carbon dioxide, or sell carbon diox-

ide as an industrial gas or dry ice. Global Thermostat operates a pilot plant at the Stanford Research Institute in Palo Alto, Calif. According to the company, its technology can also be used in the broader field of capturing emissions from sources such as power plants and chemical factories.

Bill Gates is an investor in Carbon Engineering (Squamish, British Columbia), a company commercializing technology to capture carbon dioxide directly from the air. The company is already running a demonstration plant in Squamish. Every day, the company converts roughly a ton of carbon dioxide from the air into calcium carborate. After processing, the pure carbon dioxide that is captured can be sequestered underground or sold for use in industrial processes as ultra-low emissions fuel.

Carbon Engineering partnered with Greyrock Energy (Sacramento, Calif.) to commercialize air-to-fuels (A2F) systems, converting ambient carbon dioxide and renewable power into clean, liquid transportation fuels using a Greyrock M-Class system. Carbon Engineering has developed an industrial process for the extraction of carbon dioxide from the atmosphere, and is able to integrate this system with hydrogen production and fuel synthesis. Greyrock Energy is the leading developer of small scale gas-to-liquids systems that produce clean specification liquid fuels from gaseous feedstocks and resources, such as flare gas, bio-gas, natural gas, natural gas liquids, and waste gases.

Google Ventures, the venture capital arm of Alphabet Inc., is one of the investors in Cool Planet Energy Systems (Greenwood Village, Colo.), which commercializes the Engineered Biocarbon[™] technology, an agricultural technology that increases crop production at lower cost while removing greenhouse gas from the atmosphere. It produces renewable, carbon negative fuel from biomass and can be used in agriculture, with livestock, as well as for fuels and chemicals. So far it has received \$215.4M in 8 funding rounds.

II. ENHANCED U.S. TAX CREDIT

Even though the current administration seems to be rolling back initiatives aiming at halting climate change, the Bipartisan Budget Act of 2018 enacted on Feb. 9, 2018, includes a significant exception—enhanced and expanded tax incentives promoting the capture of carbon dioxide technologies. The provision is based on a provision in a bill, S. 1535, sponsored by a group of senators led by Heidi Heitkamp (D-ND), John Barrasso (R-WY), Sheldon Whitehouse (D-RI) and Shelley Moore Capito (R-WV). The bill, titled the Furthering carbon capture, Utilization, Technology, Underground storage, and Reduced Emissions Act (FUTURE Act), was included in Senator Orrin Hatch's (R-UT) tax extenders bill, S. 2256, before it was included in the Bipartisan Budget Act of 2018.

This Act includes a new expanded version of Section 45Q. Old Section 45Q provided carbon dioxide sequestration credits for carbon captured using carbon capture equipment at a qualified facility and disposed of by the taxpayer in secure geological storage. The old credit was scheduled to expire after 75 million metric tons had been used for determining credits available to taxpayers.

A. Prior Section 45Q Credit Continues for Old Equipment, Geological Storage, or Commercial Uses New Code Section 45Q essentially continues the old credit for carbon capture equipment placed in service before Feb. 9, 2018 (referred to here as “old equipment”). Under subsection (a)(1), it provides a credit of \$20 per metric ton (adjusted for inflation) of qualified carbon oxide that is captured by a taxpayer using old equipment and disposed of by the taxpayer in secure geological storage.

The credit is reduced to \$10 per metric ton (adjusted for inflation) if the carbon oxide is (a) used as a tertiary injectant in a qualified enhanced oil or natural gas recovery project, (b) used in the fixation of the qualified carbon oxide through photosynthesis or chemosynthesis, (c) used in the chemical conversion of the carbon oxide to a material or chemical compound in which such qualified carbon oxide is securely stored, or (d) used for any other purpose for which a commercial market exists (as determined by the Secretary of the Treasury). The uses described in (a) through (d) of the preceding sentence are referred to in this article as “commercial uses.”

The credit with respect to old equipment expires at the end of the year in which the Treasury in consultation with the Environmental Protection Agency certifies that since Oct. 3, 2008, a total of 75 million metric tons of qualified carbon oxide captured by old equipment have been used for determining for available credits under old and new Section 45Q.

B. Expanded Credit for New Equipment; Unlimited for 12 Years For carbon equipment which is originally placed in service at a qualified facility on or after Feb. 9, 2018 (referred to here as “new equipment”), the new Section 45Q provides an enhanced credit per metric ton of qualified carbon oxide captured by the taxpayer and disposed of in secure geological storage.

The credit is granted during a 12-year period beginning on the date the new equipment is originally placed in service. The amount of the credit for carbon oxide captured by the new equipment depends on whether the carbon oxide is used for commercial uses and the taxable year for which the credit is determined.

The credit per metric ton of qualified carbon oxide captured by new equipment is as shown in the table below:

Calendar year in which taxable year begins	Disposed of in secure geological storage and not used for commercial use	Used for commercial use
2017	\$ 22.66	\$ 12.83
2018	\$ 25.70	\$ 15.29
2019	\$ 28.74	\$ 17.76
2020	\$ 31.77	\$ 20.22
2021	\$ 34.81	\$ 22.68
2022	\$ 37.85	\$ 25.15
2023	\$ 40.89	\$ 27.61
2024	\$ 43.92	\$ 30.07
2025	\$ 46.96	\$ 32.54
2026	\$ 50.00	\$ 35.00
2027 and each year thereafter	\$50.00 times inflation adjustment factor	\$35.00 times inflation adjustment factor

Thus, the owner of a carbon capture equipment that captures and directly disposes in secure geological storage 1 million metric tons of carbon dioxide in a taxable year that begins in 2022 could, for example, claim a tax credit of \$37.85 million in that year alone.

Another big improvement is that the credit for new equipment does not expire when the 75 million ton limit is reached. As a result, taxpayers considering investments in carbon capture equipment, as well as their investors and lenders, can better predict the credits the taxpayers will receive. The combination of higher credit amounts and a predictable life for the credit make the credit for new equipment a much stronger incentive than before.

If a facility operated old carbon capture equipment and adds new equipment on or after Feb. 9, 2018, the carbon dioxide captured up to the level of the capacity of the old equipment will receive the credit available for the old equipment, and the amount actually captured over such capacity will count towards the credit for the new equipment.

C. Carbon Oxide and Dioxide Qualifying for the New Credit The definition of qualified carbon oxide is slightly broader for new equipment than for the old. Previously, only carbon dioxide qualified for the credit, but the credit relating to new equipment is available for carbon dioxide and for other carbon oxide, e.g., carbon monoxide. To qualify, either form of carbon oxide (a) must be captured from an industrial source by carbon capture equipment; (b) would otherwise be released into the atmosphere as industrial emission of greenhouse gas or lead to such release; and (c) must be measured at the source of capture and verified at the point of disposal, injection or utilization.

In case of a facility that captures carbon dioxide directly from the ambient air (direct air capture facility), the carbon dioxide qualifies if it is measured at the source of capture and verified at the point of disposal, injection, or utilization. Qualified carbon oxide includes the initial deposit of captured carbon oxide used as a tertiary injectant but does not include carbon oxide that is recaptured, recycled, and re-injected as part of the enhanced oil and natural gas recovery process. Section 45Q provides definitions for direct air capture facility, qualified enhanced oil or natural gas recovery process, tertiary injectant, and utilization of carbon oxide.

D. Qualified Capture Facility in the U.S. A facility can qualify for the credit, if (i) it emits 500,000 metric tons or less in a taxable year and captures at least 25,000 metric tons of carbon oxide during the year that is utilized for commercial uses (as defined above), other than as a tertiary injectant; (ii) it is an electric generating facility not described in clause (i) and it captures at least 500,000 metric tons of qualified carbon oxide during the taxable year; or (iii) it is a direct air capture facility or any facility not described in the preceding two clauses and it captures at least 100,000 metric tons of qualified carbon oxide during the taxable year. In addition, the construction of the industrial facility or direct air capture facility must begin before 2024 and either the construction of the carbon capture equipment must begin before such date or the original planning and design for the facility must have included installation of carbon capture equipment.

The Section 45Q credit is limited to carbon oxide that is captured and disposed, used or utilized in the U.S. or in one of its possessions.

E. Adequate Security Measures for Geological Storage Section 45Q requires the Secretary of the Treasury, in consultation with the Environmental Protection Agency and the Secretaries of Energy and Interior, to establish regulations for determining adequate security measures for the geological storage of carbon oxide such that the carbon oxide does not escape into the atmosphere. Examples include storage at deep saline formations, oil and gas reservoirs, and unminable coal seams.

F. Entities Entitled to Claim the Tax Credit Owner of Capture Equipment

As a general rule, the Section 45Q credit relating to old equipment is attributed to the person that captures the qualified carbon oxide. By contrast, the credit relating to new equipment is attributed to the person that owns the carbon capture equipment and, in each case, physically or contractually ensures that the carbon oxide is disposed, utilized, or used as tertiary injectant. Foreign entities, for example the innovative companies from Switzerland or Canada mentioned above, may be able to take advantage of the tax credit if they pay income tax in the U.S. because they operate facilities in the U.S. or enter into joint ventures with U.S. entities.

The Section 45Q credit is a business credit subject to general limitations on business credits under Section 38. For example, business credits cannot, as a general rule, reduce corporate tax liability by more than 75 percent in a year and cannot reduce an individual's tax liability by more than 75 percent or to a level below the individual's tentative minimum tax. (In the case of a partnership or limited liability company taxed as a partnership, the credit is passed through to its partners or members and the income based limitations applied at the level of the corporation or individual owning the interest directly or through other partnerships and LLCs.) With recent tax law changes reducing the federal corporate tax rate to 21 percent and allowing for the full cost of equipment to be deducted in the year placed in service, some corporate taxpayers will have difficulty using the expanded Section 45Q credit immediately and may find themselves in a credit carryover position, at least in the first year.

Tax Equity Investors

A facility owner that is unable to use the credit may be able to monetize the credit by admitting a tax equity investor into a partnership that will own the carbon capture equipment. For example, if a Swiss company was the party owning the technology, it might form a U.S. holding corporation, which forms an LLC subsidiary, which in turn admits a U.S. bank or insurance company as tax equity investor. Any such transaction would have to be carefully structured so that the partnership or tax equity investor is treated as the owner of the new equipment for federal income tax purposes. The party claiming the credit also would need to physically or contractually ensure the capture and disposal of the carbon oxide or its utilization or use as a tertiary injectant.

This credit is a multi-year credit that depends on production (capture and disposal of carbon dioxide), rather

than capital costs of the facility. In this respect it is similar to the production tax credit (PTC) for electricity. Unfortunately, there has not been an active tax equity market for the PTC, as opposed to the energy tax credit, because the amount of future production is less predictable than the capital cost of the facility. Also, the credit requires a longer term investment, and tax equity investors traditionally tend to disfavor unproven technologies. As a consequence, the tax equity market for carbon capture technologies may be thin.

Alternative: Disposer of Carbon Oxide May Claim the Credit

As an alternative, new Section 45Q authorizes the person to which the credit is attributed to elect to allow the credit to be claimed by the person who disposes of the qualified carbon oxide, utilizes it, or uses it as tertiary injectant. This would allow one entity to deduct the capital costs for the equipment under the new general tax laws, and another to take the tax credit for the disposal of the carbon oxide under the new credit. In this area, some guidance from the Internal Revenue Service will be needed, especially regarding how and when to make an election to shift the credit to the person that disposes of the carbon oxide, utilizes it or uses it as a tertiary injectant. More importantly, it needs to be determined whether the election applies for a taxable year or for the remaining 12-year credit period for the new equipment. If the election to shift the credit is not permanent, it would allow for some attractive tax structuring options between the owner of the equipment and the company handling the disposal.

G. Further Rulemaking and Guidance Fortunately, most of Section 45Q is self-effecting and not dependent on Treasury Department guidance. However, some guidance is needed, for example concerning shifting the credit between the entities involved in the capturing and in disposal or utilization of the carbon oxide (see above). Like the old Section 45Q, new Section 45Q also requires the Secretary of the Treasury to promulgate regulations that provide for recapture of a credit with respect to carbon oxide that ceases to be captured, disposed of, or used as a tertiary injectant.

Treasury and the IRS are unlikely to provide guidance soon on matters under Section 45Q. The only item relating to Section 45Q on the Treasury's Feb. 7, 2018, 2017-2018 Priority Guidance Plan concerned inflation adjustment. Most of Treasury's and IRS's regulatory attention is focused on adopting rules for the massive tax cut legislation adopted in December 2017. But even before December 2017, the regulator had not provided much guidance on the prior version of Section 45Q. Some of the statutory mandates to provide guidance on this credit are new, but many are old. For example, the provision related to guidance on secure geological storage is a carryover from when Section 45Q was first enacted in 2008 under the Energy Improvement and Extension Act (Pub. Law 110-343) and amended in 2009.

Until the rulemaking and the guidance have been provided, the private sector will have some room to establish creative models to optimize the tax structures. Regardless, some of the return on investment in carbon capturing technologies will be its contribution to halting climate change.

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