TAX INCENTIVES DEPLOYED IN COUNTRIES LEADING THE FIGHT AGAINST CLIMATE CHANGE: How Does Canada Stack Up?[1]

SEPTEMBER 2021

Authors: Peter van Dijk, *Executive in Residence, Global Risk Institute*
Angelo Bertolas, *Senior Tax Advisor*

INTRODUCTION

Climate change is an urgent and existential threat to humanity. In a press release, dated August 9, 2021, UN Secretary General Antonio Guterres calls the recent Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) a "**code red for humanity.**"

Scientists have warned that to avoid the worst effects of global warming we must limit the global temperature increase to well below 2°C, compared to pre-industrial levels,[2] but strive to limit the global temperature increase to 1.5°C. As we have already reached an increase in global temperatures of 1.2°C, the urgency to take action is clear. The increased frequency of significant weather extremes – such as flooding, wildfires and drought – are already having a dramatic effect on people, animals and other forms of life around the world.

Governments must mobilize private capital to fight climate change. Worldwide, they don't have sufficient capital to finance the transition to a net-zero economy and achieve the Paris Agreement goal of limiting the global temperature increase to well below 2°C. Considering the magnitude and urgency of the climate change challenge, governments **must use all tools at their disposal** to mobilize private capital. These include **grants, subsidies and tax incentives.**[3]

This paper focuses on tax incentives relevant for cleantech investments and provides an overview of **tax incentive programs** implemented and announced by 10 countries leading the fight against climate change. These include Australia, Canada, China, France, Germany, Ireland, Japan, the Netherlands, the U.K., and the U.S. The results of this country overview can be found in Appendix A.

When it comes to using tax incentives to mobilize private capital for investment in cleantech, **Canada** is an **average performer** at best, especially as compared with the U.S. The **U.S.** is a **clear leader** even before the implementation of President Biden's US$ 3.5 trillion budget plan.

When we use the term "**cleantech**" in this paper, we include **all clean technologies that assist in the reduction of carbon or greenhouse gas (GHG) emissions, such as renewable energy, carbon capture, use and storage, and renewable energy storage technology.**[4]

---

1 This paper builds on a paper we published for the Global Risk Institute in Financial Services in March 2021, "How Tax Incentives can make Canada the most competitive Clean Technology in the World."

2 The industrial Revolution occurred between 1750 and 1850

3 To maximize the effectiveness of grants, subsidies and tax incentives, governments should also eliminate fossil fuel subsidies and increase carbon pricing in the form of carbon taxes or carbon trading.

4 Although perhaps controversial, we also include innovative nuclear technology – such as small modular reactor technology – in our definition of cleantech, but we did not encounter any specific tax incentives encouraging the development or use of such technology.

The magnitude of the low-carbon economy transition

Climate change is no longer just an issue for scientists and activists to worry about. They have been worried about climate change for decades, and this year their worry has been strengthened again by the Net Zero by 2050 Report of the International Energy Agency (IEA) and the IPCC's Sixth Assessment Report.

More recently, politicians and business leaders have finally started worrying about climate change as well. Some bigger picture thinkers, among them, even see the opportunity climate change represents. Countries accounting for over 70% of world GDP and GHG emissions and increasing numbers of businesses – forced by investors – have now committed to net-zero GHG emissions by 2050. This means that high-carbon businesses must shift their investment plans swiftly and clean technology businesses must increase their capital expenditures rapidly. As a result, prices for minerals, metals and other resources are already spiking[5]. However, the global transition from a high-carbon low-carbon economy is only in its infancy.

It is estimated that to meet the Paris Agreement's net-zero commitment by 2050, the production of electric vehicles must be ten times higher by 2030 than today's electric vehicle production. The number of roadside charging stations must increase thirty times. Mining companies must increase the production of critical minerals, metals and other resources five-fold and renewable energy production must increase three-fold. This – and much more – must all be done by 2030, which will require an estimated US$ 35 trillion of investments by 2030. To put this in context, this amount is about one-third of all assets currently managed by the fund management industry globally.

In short, a vast amount of private capital is required to finance the transition of the global economy from a high-carbon to a low-carbon economy. Governments must use all their tools, including tax incentives (a very powerful tool), to unlock that private capital.

Figure 1 summarizes our top observations after reviewing the cleantech relevant tax incentive programs of the 10 countries reviewed. Before comparing these specific tax incentive programs, this paper will first briefly discuss the general characteristics of effective tax incentives, when the use of tax incentives is most effective, and the various types of tax incentives.

[5] Pricing spikes are often caused by significant regulatory and permitting constraints. For example, globally, mining project approvals take sixteen years. Without weakening environmental and community protection, governments in critical resource rich countries should focus on alleviating supply constraints by streamlining and accelerating regulatory approval processes.

Figure 1

TOP OBSERVATIONS

1. MISSED OPPORTUNITIES TO USE CLEANTECH TAX INCENTIVES:

- All ten countries reviewed for this paper have targeted cleantech grants, subsidies, and low-interest rate loan programs in place at the national, subnational, and local levels. But only a few countries have **targeted cleantech tax incentives** in place.
- Virtually all cleantech tax incentives in place are **corporate tax incentives** as opposed to individual tax incentives.
- **So what?**
  - Governments – including Canada's government – need to use all tools at their disposal to unlock private capital to finance the low-carbon economy transition. Tax incentives are generally very effective in driving behaviour; however, we believe that targeted cleantech tax incentives are underutilized and should be used significantly more often.
  - Climate change is an existential threat for people. We need to capture the hearts and minds of all Canadians and introduce tax incentives that incentivize them to invest in our low-carbon economy transition.

2. SOME CLEANTECH TAX INCENTIVES CANADA SHOULD CONSIDER:

- Examples of **corporate** cleantech tax incentives include:
  - Unrestricted accelerated depreciation, **technology neutral** investment tax credits (not only for carbon capture utilization and storage), production tax credits, patent boxes, and flow-through shares.
- Examples of **individual** cleantech tax incentives include:
  - Super-deduction RRSPs and increased-limit TFSAs, investment tax credits, and flow-through shares.

3. SOME CLEANTECH TAX INCENTIVE DESIGN PRINCIPLES TO CONSIDER:

- **Certainty** – Investors need certainty to invest in clean technology. Although efficient cleantech tax incentive legislation needs sunset rules or procedures, annual renewals – such as some of the U.S. tax incentives – do not provide investors with enough certainty to make medium to long-term investment decisions.
- **Clarity and simplicity** – Cleantech incentive legislation is often unnecessarily complex and unclear. This significantly reduces the adoption and effectiveness of cleantech incentive programs.
- **Alignment and administration** – Many countries have a fast-growing number of cleantech incentives in place or in the pipeline. Aligning these incentives and creating one government body promoting and coordinating all cleantech incentives will improve the effectiveness and accessibility of cleantech incentives.
- **Driving results** – It is important to incentivize investment in clean technology, but it is even more important

to ensure that clean technology is producing results such as generating renewable energy and capturing and sequestering carbon. Production tax credits drive results, so governments should consider increasing the use of production tax credits.

4. SO WHERE DOES CANADA STAND?

Canada is an Average Performer, Especially Compared to the U.S.

- Canada provides for accelerated depreciation for investment in cleantech assets and has announced an investment tax credit for carbon capture utilization and sequestration technology as well as a reduced tax rate for manufacturing and processing of zero-emission technology. Despite that, we are not competitive in comparison with other leading nations, especially our biggest competitor, the U.S.
- The U.S. has technology neutral accelerated depreciation, investment tax credit and production tax credit programs in place and allows most of these benefits to be transferred to third party investors that can utilize them. It is noteworthy that the Biden Administration is proposing to make many of the currently non-refundable tax credits refundable. On top of that, many U.S. states have additional tax incentive programs that make the U.S. a very attractive place for cleantech investments despite their sometimes unpredictable political climate.

Table 1: Cleantech Tax Incentives

The following table highlights some of the cleantech tax incentives available in the 10 countries that we reviewed.

Cleantech Tax Incentives	Companies								Individuals		
	R&D tax Credit	Accelerated depreciation	Super deduction	Investment tax credit	Procution tax credit	Patent box	Tax attribute transfer	Tax holiday	Tax-deferred retirement savings	Investment tax credit	Tax attribute transfer
Australia	✓										
Canada	✓	✓		✓			✓				
China	✓		✓			✓		✓			
France	✓	✓				✓					
Germany	✓										
Ireland	✓	✓				✓	✓				
Japan	✓	✓		✓							
Netherlands	✓	✓	✓			✓					
U.K.	✓	✓	✓			✓					
U.S.	✓	✓	✓	✓	✓		✓			✓	

GENERAL CHARACTERISTICS OF EFFECTIVE TAX INCENTIVES[6]

Historically, the opportunity to save taxes has always proven to be a powerful driver of human behavior. Properly designed and targeted, tax incentives can be a powerful tool and play a critical role in accelerating the innovations needed for a low-carbon future.

Effective cleantech tax incentives have certain characteristics in common. The following are examples of cleantech tax incentives.

Focused on Driving Investment and Consumption Behaviour

Tax incentives must be substantial enough from a size, scope and duration perspective to drive taxpayers' investment and consumption behaviour. The objective of cleantech tax incentives should be to increase the risk-adjusted return for cleantech investments to a level where this return is competitive from a risk-return perspective. In other words, the role of tax incentives is to make the market mechanism work and attract private capital.

Governments should drive the supply side and the demand side of cleantech and renewable energy simultaneously by implementing tax incentives that encourage development of, and investment in, cleantech and renewable energy as well as complementary tax incentives that drive the use, adoption and consumption of cleantech and renewable energy. Ad hoc, scattered, piecemeal tax incentives will not accomplish the behavioural change required to achieve any measurable climate change mitigation or adoption results.

Predictable, stable, and consistent

Stability in government policies is very important for investors because it reduces investment risk. That also applies to tax incentives. Taxpayers should be confident that the government is committed to its tax incentive program and be able to rely on the availability of tax incentives for a minimum number of years. Annual extensions of tax incentives create uncertainty and are, therefore, not effective. Tax incentives should provide confidence to cleantech and renewable energy investors that they will not be radically changed or eliminated prematurely and abruptly. Governments that want to terminate open-ended cleantech tax incentives should provide a multiple-year transition period and reduce tax incentives gradually with changes announced well in advance.

Technology Neutral to Ensure that New and Innovative Technologies are not Overlooked or Excluded

Tax incentives should be targeted in nature, but technology neutral. For example, the investment in and adoption of renewable energy technology may require tax incentives, but those tax incentives should not only apply to, for example, solar power. Renewable energy technology tax incentives should be available for wind, wave and tidal, geothermal, and other renewable energy technologies as well. Technology neutral tax incentives are important because many renewable energy technologies are still evolving, and it is difficult to predict which technologies will evolve most rapidly and robustly. Countries will have to rely on multiple renewable energy technologies to reduce their carbon emissions to net-zero by 2050. Limiting the potential technologies could exclude significant potential contributors from reaching this target.

Subject to Quality and Ongoing, Long-Term Performance Standards

Tax incentives that support the initial investment in cleantech and renewable energy should include minimum quality and performance standards and only benefit investments in equipment with the capabilities, quality and maintenance support required for long-term operation and performance. For example, minimum quality and performance requirements can include industry certifications, warranties, and safety standards.

Alternatively, governments should consider implementing production-based tax incentives instead of investment-based tax incentives with minimum quality and performance standards.

[6] General tax policy principles include: Neutrality, Efficiency, Certainty, Simplicity, Effectiveness, Fairness and Flexibility. In practice, tax legislation, including tax incentives, often violate one or more of these principles.

CASE STUDY

California Tax Incentives for Wind Power … Too Much of a Good Thing

In 1980, California embarked on an aggressive mission to build alternative energy capacity through wind-generation. The California Energy Commission's goal was to have 500 megawatts of wind-generated capacity on-line by 1987.[7]

In 1980, wind turbine energy production was still in its infancy and California was anxiously trying to diversify its dependence on oil due its unstable price trajectory. A combination of federal and state legislation[8] provided a powerful incentive for the development of wind power capacity: a 15% federal energy tax credit and a 25% California energy tax credit for investment in wind power. Combining these tax credits with California's utilities[9] offering extremely attractive feed-in tariff rates for the purchase of power from independent electricity producers, resulted in a surge in wind turbine energy production capacity.

The number of wind turbines installed rose from virtually none to over 13,000 by 1986, while energy production from wind grew from basically zero to over 671 million kilowatt-hours in 1985. By the end of 1987, there was 1,436 megawatts of wind-generated capacity installed and 1,700 million kilowatt-hours were produced from wind turbines that year.[10]

The tax benefits were based entirely on the amount of invested capital and were not tied to the amount or quality of the energy produced from the wind turbines. In fact, most investments failed to live up to their promised levels of availability or production. Because the tax benefits were based on wind turbine capital cost rather than performance, it was easy for a manufacturer to sell low-quality wind turbines at a significant profit. With the interaction of the state and federal investment tax credits, along with the accelerated depreciation of the wind turbines, most investors could recover about two-thirds of their investment through the reduction of their taxes in less than three years, even without any sales of wind-generated electricity.

The huge number of installed wind turbines that resulted from the wind energy program significantly exceeded the California Energy Commission's goal to have 500 megawatts of wind-generated capacity on-line by 1987. With the tax credits in place and contracts to purchase electricity at guaranteed feed-in tariff rates, the government had little control over the number of wind power facilities that were established. Once established, the wind power incentives proved difficult to eliminate. The California wind turbine project was ultimately terminated in 1986.

California was once the leading U.S. state wind energy market, but it was long ago overtaken by Texas and now ranks fifth in total installed capacity, behind a number of much smaller Midwestern states. While California's installed wind capacity stands at an impressive 6 gigawatts, it has added just 750 megawatts of new or repowered capacity since 2012, according to Nancy Rader, executive director of the California Wind Energy Association. She has been

---

7 California Energy Commission (1980b), p. 66. The long-term goal stated in that report was to have 7,000 to 10,000 MW in place by the year 2000. California Energy Commission (1980a), contains similar objectives.

8 The National Energy Act of 1978 and the California acts, AB 1558 and AB 3623,

9 Acting in compliance with the provisions of the Public Utility Regulatory Policies Act (PURPA)

10 https://publishing.cdlib.org/ucpressebooks/view?docId=ft838nb559&chunk.id=d0e27822&toc.depth=1&toc.id=d0e27822&brand=ucpress

quoted as saying, "land-use restrictions outside of the major existing wind resource areas [largely in the California desert as a result of the Desert Renewable Energy Conservation Plan] made it very difficult to develop wind projects in California." Wade Schauer, Wood Mackenzie's director for America's power and renewables research, noted that "several counties, including Los Angeles, San Bernardino and San Diego, have passed restrictions discouraging or banning development of large-scale commercial wind farms." As a result, companies looking to invest in California's energy market are looking to neighbouring states with more flexible policies and established grid connections with California.

California's 1980's wind power stimulus program shows how powerful the alignment of tax incentives and other policy tools, such as attractive feed-in tariffs, can be. Clearly, it can easily overshoot its target. California's program should have been technology neutral – all alternative energy sources should have qualified and not just wind power. Its program should have had a multiyear end-date to provide certainty to the renewable energy industry and – at the same time – provide an opportunity for the government to reassess the need for the program to meet the policy objectives of the program. Also, California's program should not have incentivized the investment in just any kind of wind turbine – it should have only incentivized wind turbines that met specific minimum quality, maintenance and production requirements.

Subject to Ongoing Monitoring to Facilitate Modification to Ensure Objectives are Met

As mentioned, the role of cleantech tax incentives is to make the market mechanism work and attract private capital by making the risk-adjusted return for cleantech investments competitive. Widely adopted, mature technologies should not benefit from government tax incentives, as these mature technologies can sustain themselves. Therefore, governments should adopt a comprehensive legislative tax incentive framework, subject to a regular administrative review process.

Governments should set the framework for tax incentives, including broad fiscal and policy parameters, but delegate detailed decisions about eligibility and duration to an executive branch or agency with input from non-governmental advisors and stakeholders. Such an approach would bring more expertise into decision-making, avoid arbitrary political decisions, limit incumbent stakeholders' power, and raise the odds of incentives being phased out as technologies mature or extended as promising new technologies emerge.

Aligned and Interactive with Other Government Cleantech Policies

Cleantech tax incentives are more effective and powerful if they are aligned with other government policies and regulations. For example, to supercharge tax incentives for adopting electric vehicles, these tax incentives should be supported by reducing fossil fuel subsidies, gradually increasing carbon pricing (see Figure 2) and prohibiting the sale of internal combustion vehicles by a specific date in the relatively near future. Tax incentives aiming to encourage investment in renewable energy can be combined with feed-in tariff programs – under which utilities purchase renewable energy at a fixed price. Feed-in tariffs have proven to be very effective in stimulating the development of renewable energy projects and the generation of renewable energy.

CASE STUDY

Scaling Retrofits – Combining the use of Tax Incentives with other Financing Tools

A recent report titled "Canada's Climate Retrofit Mission"[11] produced by Efficiency Canada, a policy advocacy and research organization at Carleton University, highlights the woeful situation that Canada finds itself in with respect to retrofitting thousands of energy inefficient buildings. The Report outlines a policy framework focused on triggering economies of scale and innovations to reduce costs, increase speed and enhance value. Leveraging a successful Dutch retrofit model, on-the-ground market development teams will coordinate the upgrading of several buildings at once and introduce new retrofit models.

So far, the Canadian federal government has only focused on inefficient piecemeal policies to encourage climate-friendly retrofits to buildings such as a new grant of up to C$5,000 toward energy-efficiency investments, including, for example, heat pumps and window replacements. At the current pace, it will take 142 years to retrofit all low-rise residential buildings and 71 years to retrofit all commercial floor area.[12] Current policies are focused on tactical, short-term – and some would say political – results and encourage an inefficient, segmented and uncoordinated approach. The report estimates that renovating residential and commercial spaces to meet Canada's 2050 net-zero emissions target would cost between C$580 billion and C$972 billion in the decades ahead, with a mix of public and private investment. Continuing in the current piecemeal manner will bring only modest emission reductions at high costs.

The report makes a compelling argument for a complete rethink of the renovation process suggesting that rather than just subsidizing already available renovation options, the government should attempt to reshape the renovation market itself by using new organizational structures and planning methods to encourage innovation, build economies of scale and make the entire retrofit experience simpler for property owners. This approach also creates economic opportunity through developing energy-efficiency solutions that could be shared with other countries with cold winters and/or hot summers.

Developing and scaling energy-efficiency solutions can be encouraged by tax incentives, including refundable R&D tax credits, investment tax credits and accelerated depreciation. The global exploitation of new energy-efficiency technologies developed in Canada can be supported by, for example, allowing energy-efficiency technology royalties to benefit from a low-income tax rate as part of a "Patent Box" arrangement.

The report recommends eliminating the "one-at-a-time, bespoke nature of historical retrofit practice" and instead, focus on groups of buildings that are pooled together to create economies of scale based on factors such as geography and building type. This approach would include the establishment of a new federal agency based on the Dutch retrofit model "Energiesprong," in which "market development teams" would operate across Canada. The market development teams would bring together property owners with similar building types, and would work with all retrofit stakeholders, including building owners, contractors, suppliers, utilities, and governments, to launch projects aimed at producing best practices that could be replicated elsewhere. The new federal agency would aggregate the data, learn from similar efforts elsewhere and, most importantly, ensure the scale-up of whatever worked best.

[11] https://www.efficiencycanada.org/report-canada-needs-a-mission-based-approach-to-decarbonize-our-buildings/

[12] https://www.efficiencycanada.org/report-canada-needs-a-mission-based-approach-to-decarbonize-our-buildings/

Some of the advantages of this model would result in technological advances to meet mass retrofit needs, manufacturing efficiencies, and greater specialization within the labour force. Ultimately, this will make the retrofit experience simple, affordable, and desirable for building users, rather than the confusing and financially risky undertaking it is today.

The report further suggests an increased use of "energy performance contracts" to finance retrofits. Energy performance contracts reduce the upfront costs and reduce the overall risks associated with a retrofit. These arrangements allow private sector financing to be provided to building owners based on lenders being repaid from the savings on energy bills. The retrofit risk is shared as the loans are structured so that building owners do not take the full hit if promised savings fail to materialize.

Objective, Clear and Simple

Requirements to qualify for tax incentives should be objective, clear and simple. Taxpayers should be able to easily understand the requirements for the tax incentives. If the requirements are met taxpayers should be able to rely on receiving the benefits without any administrative issues. Taxpayers in similar situations should be treated equally.

Well-Advertised and Understood

Even the best-designed and most generous tax incentives are not effective if they are not known or understood by taxpayers. Relevant awareness building and education are often overlooked. Governments should allocate dedicated communication, marketing and educational resources to the launch of new tax incentive programs which should then stay in place throughout the program lifecycles.

Beyond being publicized domestically, tax incentives should be publicized internationally if a country is trying to attract foreign capital for large commercial renewable energy projects such as wind and solar plants. Opportunity exists to tap into significant pools of investment capital by providing education to institutions managing large scale investment programs on behalf of clients.

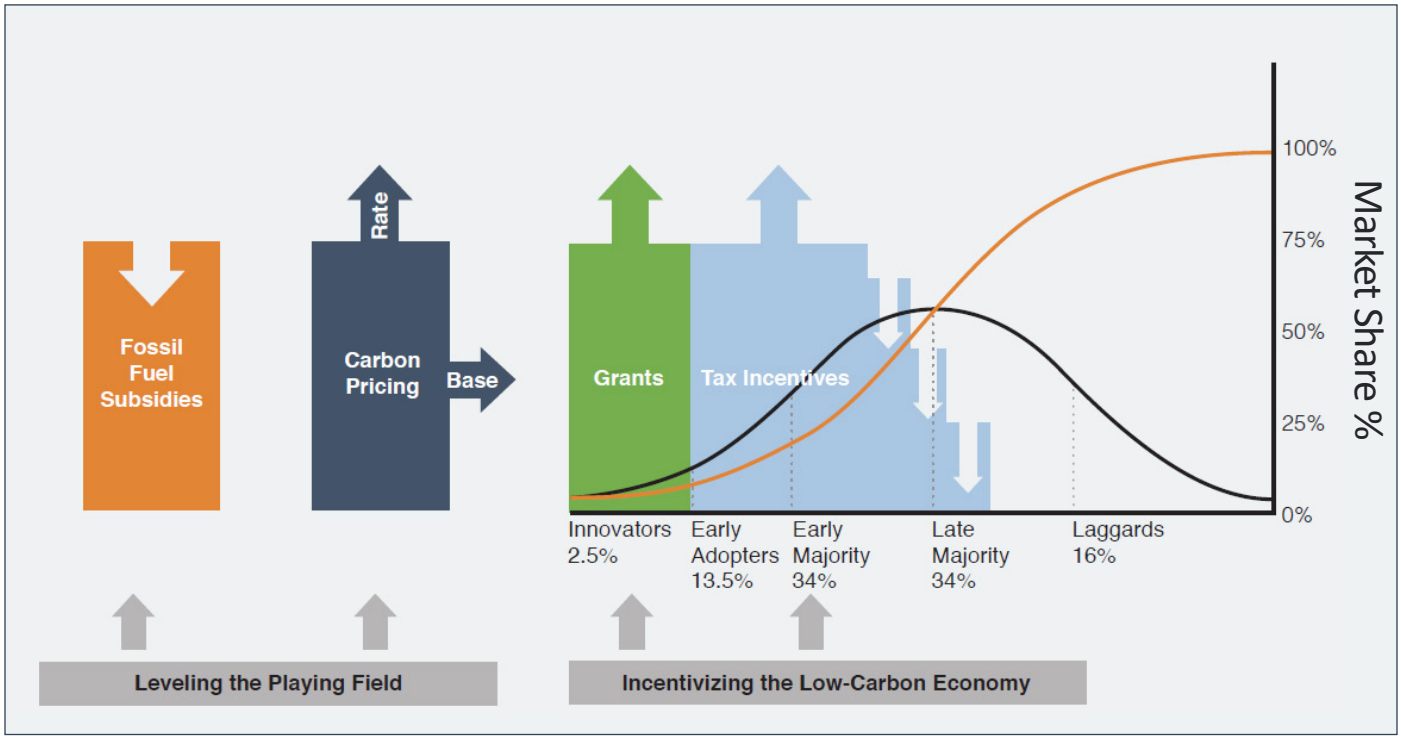
Administered Efficiently

The effectiveness of tax incentives is heavily dependent on how programs are administered. Tax authorities have the knowledge, systems, data and skills required to administer tax incentives efficiently. However, their fundamental mandate to collect revenue, and their revenue raising culture, can interfere with administering an expenditure program such as cleantech tax incentives. Governments may therefore decide to create separate units within their tax administrations dedicated to administering tax incentives. These tax incentives units should be responsible for administering, advertising and educating taxpayers about available tax incentive programs.

WHEN USING TAX INCENTIVES IS MOST EFFECTIVE

Tax incentives are not a cure-all for cleantech. For example, tax incentives are generally not very useful during the early R&D stage, unless the R&D tax incentives are refundable or transferable to taxpayers that can utilize the R&D tax credits. During the early R&D stage, grants may be a more effective tool to encourage investment. However, tax incentives can be very effective during the commercialization and mass-adoption phases of new clean technologies. Widely adopted clean technologies should not benefit from tax incentives either, as these technologies can sustain themselves (see Box 2).

Figure 2: The 3 Steps Fiscal Measures Plan for Climate Change



Early-stage R&D may generate knowledge leading to breakthrough innovations. However, R&D is generally underfunded by businesses because financial returns from R&D are usually slow to materialize and highly uncertain. Financial returns are also not necessarily realized by the businesses that undertake and fund the R&D. The government should play a proactive and significant role during the R&D – and especially the early R&D – phase. Generally, R&D tax credits, even when they are refundable or transferable, are not always the most efficient and effective funding mechanism for early-stage R&D. More generous, targeted and actively managed public funding of R&D through grants, subsidies and loans, may be more effective than general tax incentives to encourage and accelerate climate change focussed R&D.

Combining and aligning multiple fiscal incentives for cleantech can be a much more powerful and holistic approach to developing a strong cleantech industry:

- targeted R&D grants for cleantech innovators,
- accelerated depreciation, investment tax credits and production tax credits for adopters of cleantech, and
- reduced corporate income tax rates for companies licencing Canadian cleantech to the world – also referred to as a "Patent Box" for cleantech innovation.

This "vertical integration" of fiscal measures can supercharge the development of cleantech, accelerate its adoption and facilitate its retention and exploitation in Canada.

Different players in the innovation process are in different tax positions and looking for different tax incentives. For example, accelerated depreciation will have no value for a start-up that does not generate any taxable profit yet. However, if you combine accelerated depreciation with flow-through shares[13], it becomes a powerful incentive for the start-up to attract investors in a taxpaying position.

[13] Shares that entitle an investor in a start-up to use the unused accelerated depreciation of the start-up.

Once a new technology has been developed, the next challenge is to commercialize it. Early adopters play an essential role during this phase of the innovation adoption curve, where investment and production tax credits can be very effective. Also, growth-oriented investors (such as private equity growth funds), focused on identifying companies that are moving successfully along the early stages of the curve, play a vital role during this commercialization or early-adoption phase. Attracting growth-oriented investors has been a challenge in Canada for a long time. Investment tax credits can also be effective in attracting growth-oriented investors. In addition to providing tax incentives, the government can play an essential role as a market-maker by developing a cleantech innovation-based procurement program.

At some point along the innovation adoption curve, a new technology reaches critical mass where the number of individual adopters ensures that the innovation is self-sustaining. Although this critical mass point is somewhat subjective, it is probably reached when the market share of an innovative technology reaches an adoption rate of 50% or more. At that point, new technologies are mature, and tax incentives are no longer required, nor are they effective and efficient. When the critical mass point is reached, tax incentives should be gradually reduced and, over time, phased out.

Tax incentives are only effective along part of the innovation adoption curve. Generally, tax incentives are not effective during the early R&D phase and after new technology is widely adopted. Therefore, as opposed to permanently baking specific tax incentives into tax legislation, governments should adopt a comprehensive legislative tax incentive framework subject to a regular administrative review process. Governments – including Canada's – would be better served if they set the framework for tax incentives, including broad fiscal and policy parameters, but delegated detailed decisions about eligibility and duration to executive branches or agencies with input from non-governmental advisors and stakeholders. Such an approach would bring more expertise into decision-making, avoid arbitrary political decisions, limit incumbent stakeholders' power, and raise the odds of incentives being phased out as technologies mature or extended as promising new technologies emerge.

VARIOUS CATEGORIES OF TAX INCENTIVES

Throughout the world, tax incentives have supported public policies designed to stimulate the development of cleantech markets and industries. Tax incentives are often complementary to other types of cleantech incentive programs such as grants and subsidies. Cleantech tax incentives are also often used in combination with carbon taxes and regulations. For example, to encourage the rapid adoption of electric vehicles, a country may implement:

- a gradually increasing carbon tax and a gradual elimination of all fossil fuel subsidies
- a measure prohibiting the sale of internal combustion engine cars by, for example, 2035
- an investment tax credit for companies building electric vehicle charging stations
- an investment and production tax credit for manufacturers of electric vehicles
- a subsidy for purchasers of electric vehicles
- a toll exemption for electric vehicles using toll routes

Tax incentives are powerful and highly flexible policy tools that can be targeted to encourage specific clean technologies and to impact select cleantech market participants, especially when used in combination with other policy tools.

A variety of tax incentives are used globally to help stimulate the development and growth of clean technologies. Tax incentives should not be confused with outright payments in the form of grants and subsidies for investing in cleantech or producing renewable energy. Tax incentives can only be used to reduce the amount of taxable income or taxes owed by a cleantech company, investor, or consumer.

Since cleantech companies, investors, and consumers of renewable energy have varying degrees of tax liability, it is possible that some tax incentive recipients will be unable to fully utilize them.

The effectiveness of tax incentives in encouraging cleantech investment will be reduced if taxes owed are insufficient to utilize the full amount of the incentives. In some circumstances this can be a critical limitation to their use. This challenge can be mitigated by, for example, allowing tax incentives to be carried forward to future years. Alternatively, a more powerful way of mitigating this challenge is through the use of mechanisms that permit the transfer of tax incentives to investors that have the tax capacity to utilize the tax incentives – for example, flow-through shares – or by making the tax incentives refundable. Making investment tax credits refundable can also effectively encourage tax exempt institutional investors, such as pension funds, to invest in cleantech and renewable energy.

The following is an overview of the various types of tax incentives used to support cleantech and renewable energy internationally.

Business Tax Incentives

R&D Tax Credits

A percentage of R&D expenses is allowed to be credited against the tax liability of the business performing the R&D. R&D tax credits are not always an effective tax policy tool. For example, if the business performing the R&D is not profitable, the R&D tax credit has no tax liability offset and, therefore, no value. This can be remedied by making the R&D tax credit refundable or transferable to investors that have the tax capacity to utilize the tax credit. Alternatively, instead of using R&D tax credits, governments can use grants or subsidies to encourage specific R&D and innovation. Grants and subsidies also allow governments more targeted influence on the nature and the quality of the R&D performed.

Accelerated Depreciation

Businesses investing in cleantech and renewable energy and entitled to accelerated depreciation, can depreciate assets for tax purposes at a percentage significantly exceeding depreciation for accounting purposes. For taxable businesses, the tax deduction of accelerated depreciation in the early years significantly reduces taxable income in those years. This reduced tax burden increases free cash flow and the net present value of the investment in cleantech assets. This is especially effective for capital-intensive businesses, such as renewable energy, with higher upfront capital costs and lower ongoing production costs.

Investment Tax Credits

Investment tax credits allow a business making a capital investment in cleantech or renewable energy assets to claim a percentage of its capital investments as a credit against its tax liability. Qualification for investment tax credits may be subject to investment size limits, performance requirements, etc. One of the common problems with investment tax credits is that they incentivise the installation of cleantech and renewable energy assets, but not the assets' ongoing performance and production. Some jurisdictions rightfully impose specific quality standards or performance targets to qualify for the investment tax credit.

Investment tax credits can also apply to building retrofits, rooftop solar installations and climate adaptation investments.

Production Tax Credits

Production tax credits provide reduced tax rates for income generated with cleantech and renewable energy assets (e.g., wind and solar power generated or carbon captured and sequestered). Production tax credits focus on the efficient and long-term generation of cleantech and renewable energy income as opposed to investment in cleantech and renewable energy assets. Some jurisdictions are now moving to production tax credit mechanisms to ensure long-term cleantech performance and renewable energy production.

Super Expense Deduction

Some countries allow certain qualifying cleantech related expenditures – for example R&D expenses – to be deducted at a rate significantly exceeding 100%. A super expense deduction works as an indirect tax credit. Where a tax credit reduces the tax liability directly ("below the line"), the super expense deduction reduces taxable income which indirectly reduces the amount of tax due ("above the line").

"Patent Boxes"

Patent boxes are reduced tax rate regimes for qualifying intellectual property income, such as royalties received from licensing cleantech. A cleantech patent box encourages the development and acquisition of clean technology and its exploitation by licensing it to third party users worldwide. Patent boxes are an effective tax incentive mechanism to ensure that clean technology developed in a country remains within the country, and the country benefits from the exploitation of this clean technology. A cleantech patent box also supports the development of a knowledge-based cleantech culture with well-paying jobs within the country.

Tax Attribute Transfers

Some businesses in the cleantech and renewable energy space are not profitable and therefore not taxable. Businesses that are not taxable are unable to use profit-dependent tax attributes such as accelerated depreciation, non-refundable R&D tax credits and investment tax credits. This problem can be resolved by making some of these tax attributes refundable or by allowing them to be transferred to other taxpayers that are taxable. Canadian "flow-through shares" and U.S. "tax equity financing" structures are examples of tax attribute transfer mechanisms.

CASE STUDY

How Bank of America leverages Tax Incentives to embrace Climate Change as an Opportunity – U.S. Tax Equity Financing

Bank of America (BofA) is one of the world's largest financial institutions, serving individual consumers, small and middle-market businesses, and large corporations with a full range of banking, investing, asset management and other financial services. BofA recognizes that climate change poses a significant risk, but it also recognizes that climate change provides for significant opportunity.

BofA has estimated that increasing client demand for low-carbon financing represents an opportunity of US$445 billion in additional business from 2007 to 2030. Predominantly through lending, BofA has already achieved US$145 billion of environmental business commitments between 2007 and 2019 and has committed an additional US$300 billion in additional funding through 2030 for low-carbon business activities as part of their focus on deploying capital for responsible, sustainable growth.

Tax Incentives are one factor in BofA's overall sustainable business strategy as evidenced by BofA's recent CDP (formerly the Carbon Disclosure Project) Report:

"We conduct research, discuss with clients and other stakeholders, and incorporate regulatory incentives into our clean energy strategic planning and transactional work. An example opportunity is the tax credit for CO2 sequestration from carbon capture projects provided by Section 45Q of the U.S. Internal Revenue Code. State tax policies complement these federal tax incentives. As a result, we anticipate substantial capital will be deployed to carbon capture technologies, and this creates opportunities for us to provide financing to our clients who are looking at carbon capture applications."

Policies that place a price on carbon, require carbon emission reductions, and incentivize clean energy, energy efficiency and carbon sequestration, are important for enabling the growth needed to deliver the Paris Agreement goals, and they create a framework that supports low carbon financing. Renewable energy financing businesses benefit from tax incentives such as the U.S. federal investment tax credit and production tax credit. BofA's Renewable Energy Finance team provides financing enabled by these U.S. federal tax credits, generally referred to as "tax equity financing"[14]. Section 45Q of the U.S. Internal Revenue Code provides a tax credit for CO2 sequestration. Updates made in 2018 to Section 45Q will increase the tax credit to US$35 per metric ton for CO2 captured and used, and US$50 per metric ton for CO2 captured and stored permanently by 2026. This tax measure provides a 12-year stream of credits to carbon capture projects, based on the volume of CO2 sequestered. Tax policies adopted by numerous state governments complement these federal tax incentives. As a result of these tax credits, BofA anticipates substantial capital will be deployed to carbon capture technologies, which in turn will require significant third-party financing.

In 2019, BofA worked on several tax equity transactions in the U.S. that were announced in 2020. Tax equity financing was provided to ENGIE North America for 2 gigawatts of renewables, including 1.5 gigawatts of onshore wind and 500 megawatts of utility-scale solar. As part of this transaction, ENGIE North America received funding for two wind farms. This transaction is said to be the largest tax equity transaction of its kind in the U.S. BofA also provided tax equity financing to RWE Renewables for its 151-megawatt Peyton Creek wind farm in Matagorda County, Texas, which hosts 48 wind turbines and produces enough electricity to power more than 45,000 homes.

The market potential for sustainable investment is very large and tax incentives can help unlock this potential. A 2018 study by the International Institute for Applied Systems Analysis shows that low-carbon investments will need to increase dramatically if the world is to achieve the Paris Agreement's target of keeping global warming well below 2°C. To meet the Nationally Determined Contributions (NDCs) of countries under the Paris Agreement, the study found that an additional annual investment of US$130 billion is needed by 2030. To achieve the 2°C target of the Paris Agreement the gap is US$320 billion and for the 1.5°C target the shortfall is US$480 billion per year. Achieving these goals will mean transforming the global economy. Attracting the support and commitment of financial services firms like BofA with the scale, expertise, and influence to attract large amounts of capital to meet the demand is important for governments but more importantly it makes great business sense for companies to become early adopters and incorporate these strategies into their business models a soon as possible.

[14] Tax equity financing transactions are transactions that pair tax credits – or other tax benefits – generated by a qualifying physical investment with the capital required for that investment. In general terms, under these transactions, the party making the qualifying physical investment agrees to assign the right to claim the tax credits to another party that provides the capital required for the investment. This transfer of tax credits in exchange for capital usually occurs within a partnership structure or a legally binding contractual arrangement.

Import Duty Reductions

Import duty reductions on parts and equipment used by cleantech and renewable energy manufacturers are very effective during early industry development when a country doesn't yet have its own relevant technical expertise and manufacturing capabilities. Reducing import duties on components and not on systems will encourage inbound technology transfer and domestic manufacturing of cleantech and renewable energy equipment.

Property Tax Reductions

Cleantech, and especially renewable energy, can be very capital intensive in terms of land and fixed assets. Property tax reductions can, hence, be a very important benefit for capital intensive industries such as wind and solar power generation.

"Tax Holidays"

Tax holidays exempt specific taxes for a limited time period. These taxes include excise, property, income, sales and value-added taxes. They are particularly useful in the start-up phase of a cleantech or renewable energy project providing much needed cash flow upfront.

Personal Tax Incentives

Enhanced Tax-Deferred Retirement Savings Plans

Tax-deferred retirement savings plans can be enhanced by increasing allowable individual tax deductions or by allowing individuals to deduct more than 100 per cent of their investment in cleantech products. Allowing individuals to contribute to enhanced tax deferred retirement savings plans can capture the hearts and minds of citizens, which will be critically important in mobilizing private capital.

Investment Tax Credits

Individuals investing in cleantech, such as solar panels, retrofits, energy efficiency measures and flood protection, can claim a percentage of their investment as a credit against their personal tax liability. These investment tax credits may be subject to size and quality limits.

Similarly, individual investors investing in shares of qualifying cleantech or renewable energy companies can claim a tax credit against their income tax liability equal to a percentage of their investment.

Sales And Value-Added Tax Reductions

To make qualifying cleantech and renewable energy products more affordable, countries may reduce sales and value-added taxes for these products.

Property Tax Reductions

Individuals who have, for example, retrofitted their homes or installed solar panels, are entitled to a reduced property tax rate.

Tax Attribute Transfers

Tax attributes not used by a business due to insufficient taxable income can be used by individuals who have invested in that business. There are different mechanisms to accomplish tax attribute transfers. For example, individuals owning "flow-through shares" may be able to claim tax attributes surrendered by the business in which they own these shares.

CLEANTECH TAX INCENTIVE PROGRAMS IN TEN COUNTRIES LEADING THE FIGHT AGAINST CLIMATE CHANGE

The foregoing provides a comprehensive view of the general characteristics of effective tax incentives, when using tax incentives is most effective, and the various types of tax incentives. Diving deeper, Appendix A provides an overview of the main tax incentive programs impacting cleantech, implemented and announced by ten countries[15] leading the fight against climate change. These include Australia, Canada, China, France, Germany, Ireland, Japan, the Netherlands, the U.K., and the U.S.

CONCLUSION

Governments can play a significant role in mobilizing private capital investments required to meet the Paris Agreement's 2030 interim goal on the way to net-zero GHG emissions by 2050. Considering the magnitude and urgency of our climate change challenge, governments **should use all tools at their disposal to mobilize private capital. These include grants, subsidies and tax incentives.**

We have reviewed 10 countries that can be considered leaders in the fight against climate change. All have many targeted cleantech grants, subsidies and low-interest rate loan programs in place at the national, subnational and local level. However, only a few of these countries have targeted cleantech tax incentives. As properly designed tax incentives historically have proven to be very effective in driving behaviour, governments should consider increasing the use of cleantech targeted tax incentives to accelerate the transition to a sustainable and low-carbon economy.

Almost all of the tax incentives reviewed are corporate tax incentives. As winning the hearts and minds of ordinary people will be critically important to win the existential fight against climate change, introducing more individual taxpayer focussed tax incentives can be a powerful tool. A super-deduction RRSP for qualifying cleantech investments – as suggested by the Expert Panel on Sustainable Finance – is one concept Canada should consider. Canada should also consider increasing the TFSA limit for qualifying cleantech investments and expanding the use of flow-through shares in the cleantech industry.

Although Canada may be a cleantech innovation leader, we are certainly not a leader in using tax incentives to expedite our transition to a sustainable and low-carbon economy. When it comes to using tax incentives to mobilize private capital for investment in cleantech, Canada is an average performer at best. This holds true especially in comparison with the U.S. The U.S. is a clear leader when it comes to using targeted cleantech tax incentives, even before implementation of President Biden's US$ 3.5 trillion budget plan.

Canada is disproportionately impacted by climate change. We cannot afford to be followers and must lead when it comes to fighting climate change. Increasing the use of well-designed and targeted cleantech tax incentives for Canadian corporations and Canadian individuals can contribute significantly to accelerating our urgently needed transition to a sustainable and low-carbon economy.

[15] In selecting these countries, we have taken some guidance from the IHS Markit study, *Global Renewables Markets Attractiveness Rankings* (May 2021), and the 2021 EY Renewable Energy Country Attractiveness Index (RENCAI) (November 2020). In arriving at their respective most attractive renewable energy investment countries, IHS Markit and EY were guided by current policy frameworks, market fundamentals, investor friendliness, infrastructure readiness, revenue risks and return expectations, easiness to compete and the overall opportunity size for each market. Canada was not included in the IHS Markit and EY top 10 most attractive renewable energy investment markets. In the EY RENCAI, Canada ranked 16th.

APPENDIX A

Cleantech Tax Incentive Programs in 10 Countries Leading the Fight Against Climate Change

Appendix A provides an overview of the main tax incentive programs impacting cleantech, implemented and announced by 10 countries[16] – including Canada – leading the fight against climate change. We will summarize the main relevant tax incentives of Australia, Canada, China, France, Germany, Ireland, Japan, the Netherlands, the U.K., and the U.S.

AUSTRALIA

Australia's sustainability and cleantech tax incentive program is still emerging. Currently, various targeted sustainability grant and funding programs are offered by the federal, state and territorial governments. The Emerging Renewables Program (ERP), for example supports renewable energy technology at the development, demonstration and commercialization stages of the innovation chain. The aim of ERP is to lower the cost of energy produced by renewable energy technologies to a point where they are better able to compete with traditional fossil-fuel technologies. Funding can range from AU$ 2 million to AU$ 30 million.

To coordinate some of its funding programs, the federal government has established the Australian Renewable Energy Agency (ARENA) with the objective of improving the competitiveness of renewable energy technology and increasing the supply of renewable energy in Australia. ARENA is funded with AU$ 2.5 billion for renewable energy projects and research and development activities.

Australia does not have a carbon tax. Political agreement on a carbon emissions reduction target exists, but there is no agreement on how to reach that goal. There is a federal excise tax on gas, diesel and other fuels. Additionally, there are multiple state and territory levies, charges and fines on pollution.

At the federal level, there are no user charges on electric vehicles but some states, such as Victoria, recently introduced user charges on zero and low emission vehicles, while simultaneously proposing incentives to purchase electric vehicles.

Tax Incentives

R&D Tax Credits

Australia has a general R&D tax incentive program, which is broad-based and accessible to all industry sectors. Cleantech and renewable energy R&D are eligible for this. It offers two tiers of incentive based on the revenue of the company applying. Companies with revenue of less than AU$ 20 million can access a refundable 43.5 per cent R&D tax credit, and companies with revenue of AU$ 20 million or more can access a non-refundable 38.5 per cent R&D tax credit. The maximum amount of R&D expenditures that can benefit from R&D tax credits is limited to AU$150 million per year. Unused non-refundable credit amounts may be carried forward to future income years.

CANADA

Canada has sustainability incentive and tax programs at the federal, provincial and territorial levels that have been in place for several years and continue to evolve and expand.

Canada's federal government is making significant investments in sustainability and climate change. Recent investments include a CA$ 6 billion allocation to the Canada Infrastructure Bank for green infrastructure (2020 Fall Economic Statement, October 2020), a new CA$ 15 billion climate plan (December 2020), a CA$ 15 billion public transit fund (February 2021), and CA$ 17.6 billion in additional green recovery investments announced in the

[16] In selecting these countries, we have taken some guidance from the IHS Markit study, Global Renewables Markets Attractiveness Rankings (May 2021), and the 2021 EY Renewable Energy Country Attractiveness Index (RENCAI) (November 2020). In arriving at their respective most attractive renewable energy investment countries, IHS Markit and EY were guided by current policy frameworks, market fundamentals, investor friendliness, infrastructure readiness, revenue risks and return expectations, easiness to compete and the overall opportunity size for each market. Canada was not included in the IHS Markit and EY top 10 most attractive renewable energy investment markets. In the EY RENCAI, Canada ranked 16th.

2021 Federal Budget. These amounts will be spread out over the next five to seven years.

In 2016, Canada adopted its climate plan, the Pan-Canadian Framework on Clean Growth and Climate Change (PCF). The PCF is built on four pillars: pricing carbon pollution; complementary actions to reduce carbon emissions across the Canadian economy; adaptation and climate resilience; and clean technology, innovation, and jobs. The PCF includes more than fifty specific initiatives across all sectors of the Canadian economy – its objective is to meet Canada's commitments under the Paris Agreement.[17]

In 2018, Canada's federal government created the Expert Panel on Sustainable Finance to investigate how the financial sector can assist in achieving Canada's climate objectives. In June 2019, the expert panel released its final report with 15 recommendations outlining opportunities for financing sustainable growth. The federal government has started implementing some of the expert panel's recommendations.

Canada established a carbon pricing framework in 2018, the Greenhouse Gas Pollution Pricing Act. Flexibility was provided to provinces and territories to establish their own carbon pricing plans with a federal backstop to be implemented if a provincial or territorial plan does not meet federal standards. In March 2021, the Supreme Court of Canada upheld the constitutionality of the carbon tax. Currently, Canada's carbon tax rate is CA$ 30 per tonne and will rise to CA$ 170 per tonne by 2030. According to the IMF, however, Canada currently only subjects nine per cent of all its carbon emissions to its carbon tax. Also, according to a recent Bloomberg NEF report for the Net Zero Owner Alliance, in 2019, Canada was the fourth-highest fossil fuel subsidizing country in the G-20 with a per capita amount of US$ 446.

Currently, Canada has some federal sustainability funding programs, a federal tax accelerated depreciation regime for qualifying clean energy investments, and several provincial sustainability programs, most taking the form of grants or rebates.

Tax Incentives

R&D Tax Credits

Canada's R&D tax credit program – Scientific Research and Experimental Development (SRED) – provides a 15 per cent federal tax credit on all eligible R&D expenditures. An enhanced tax credit of 35 per cent is available for small, Canadian-controlled, private corporations (CCPCs) on the first CA$ 3 million of R&D expenditures per year. The annual expenditure limit must be shared among associated corporations. The 35 per cent R&D tax credit for CCPCs is refundable. Unused R&D tax credits may be carried forward 20 years and carried back for three years.

SRED is defined as "a systematic investigation or search that is carried out in a field of science or technology by means of experiment or analysis that involves basic research, applied research or experimental development and includes work undertaken by, or on behalf of, the taxpayer with respect to engineering, design, operations research, mathematical analysis, computer programming, data collection, testing or psychological research where the work is commensurate with the needs and directly in support of the basic research, applied research or experimental development." The work must be undertaken in Canada. Qualifying SRED expenditures may include labor, materials consumed or transformed, subcontracts, other expenses directly related and incremental to the SRED, and third-party payments. Only 80 per cent of subcontractor and third-party costs is eligible. The SRED incentive is not limited to particular industries.

Most provinces and territories offer R&D tax credits ranging from 3.5 per cent to 30 per cent, and several offer refundable credits.

[17] For an update on the progress made see the *Pan-Canadian Framework Third Annual Synthesis Report.*

Accelerated Depreciation

Under Classes 43.1 and 43.2 in the Income Tax Regulations, qualifying capital investments in systems that produce heat or electric power efficiently from fossil fuels or from alternative renewable energy sources are eligible for an Accelerated Capital Cost Allowance (ACCA), at an annual rate of 30 and 50 per cent, respectively, on a declining balance basis. Without these accelerated write-offs, many of these assets would be depreciated at annual rates of 4 to 20 per cent. On a temporary basis, the 2018 Fall Economic Statement introduced full expensing of clean energy equipment included in Class 43.1 or 43.2.

Generally, qualifying clean energy equipment is eligible for an accelerated depreciation rate of 30 per cent under Class 43.1, or, if acquired after February 22, 2005, and before 2025, an accelerated depreciation rate of 50 per cent under Class 43.2.

The new rules provide an enhanced first-year allowance for clean energy equipment acquired after November 20, 2018, that becomes available for use before 2028. The enhanced first-year allowance provides taxpayers with an immediate write-off of the full cost of clean energy equipment if the property becomes available for use before 2024. The enhanced first-year allowance will then be phased out as follows:

- For property that becomes available for use in 2024 and 2025, the enhanced first-year allowance is reduced to 75 per cent of the cost of the clean energy equipment; and
- For property that becomes available for use in 2026 and 2027, the enhanced first-year allowance is reduced to 55 per cent of the cost of the clean energy equipment.

Clean energy equipment that becomes available for use after 2027 will be included in Class 43.1 and subject to a 30 per cent depreciation rate.

The 2021 Federal Budget expanded the list of eligible equipment with equipment used in pumped hydroelectric energy storage, renewable fuel production, green hydrogen production, and hydrogen refueling. The budget also removed certain restrictions related to investments in water current, wave and tidal energy, active solar heating, and geothermal energy technologies. Last, but not least, the budget eliminates the eligibility of certain fossil-fuelled and low-efficiency waste-fuelled electrical generation equipment after 2024.

Comments

As opposed to a tax credit – which provides a taxpayer with a permanent tax benefit – accelerated depreciation only provides a taxpayer with a timing benefit – a time-value-of-money benefit. It allows a taxpayer to upfront the cost of an investment in cleantech assets for tax purposes. Having said that, accelerated depreciation can still provide a strong incentive to invest in cleantech assets. This incentive to invest would be significantly stronger if the accelerated depreciation expense was allowed to be offset against income other than just income generated by the cleantech assets qualifying for accelerated depreciation. Unfortunately, the accelerated depreciation for Classes 43.1 and 43.2 clean energy assets can only be offset against income from these assets and not against income from other assets. Allowing deduction of accelerated depreciation of Classes 43.1 and 43.2 assets against other income would significantly enhance the effectiveness of these rules.

Low Tax Rate Zero-Emission Technology Manufacturing and Processing

The 2021 Federal Budget introduced a temporary measure to reduce corporate income tax rates by 50 per cent for manufacturers of zero-emission technologies. This means that taxpayers subject to the 15 per cent general corporate tax rate can apply a 7.5 per cent tax rate on eligible zero-emission manufacturing and processing income and taxpayers subject to the 9 per cent small business tax rate can apply a 4.5 per cent tax rate on such income. A taxpayer only qualifies for the reduced tax rates on its eligible income if at least 10 per cent of its gross revenue

from all active businesses carried on in Canada is derived from eligible activities.

Eligible zero-emission technology manufacturing or processing activities include manufacturing of solar, wind and water energy conversion equipment, geothermal energy equipment, ground source heat pump system equipment, renewable energy and grid-scale energy storage equipment, zero-emission vehicles, batteries and fuel cells for zero-emission vehicles, electric vehicle charging systems, hydrogen refuelling stations for vehicles, and equipment used for the production of hydrogen by electrolysis of water. Production of hydrogen by electrolysis of water and the production of renewable solid, liquid or gaseous fuel also qualify as eligible activities.

The reduced rates will be gradually phased out, starting in taxation years that begin in 2029, and fully phased out for taxation years that begin after 2031.

Investment Tax Credit

The 2021 Federal Budget also announced an investment tax credit for capital invested in Carbon Capture, Utilization, and Storage (CCUS) projects. The objective is to reduce CO2 emissions by at least 15 megatonnes annually. This CCUS investment tax credit will come into effect in 2022. The federal government will announce the details – including the rate – after a 90-day consultation period with stakeholders on the design of the investment tax credit. The consultation period was open until September 7, 2021.

The investment tax credit is intended to be available for a broad range of CCUS projects across different industry subsectors, such as concrete, plastics and fuels. Blue hydrogen and direct air capture projects also qualify, but the captured CO2 cannot be used for enhanced oil recovery (EOR) projects.

Tax Attribute Transfer

Certain eligible renewable energy and energy conservation expenses can be transferred by a corporation to its investors utilizing flow-through shares.

Flow-through shares (FTS) have been used in Canada for more than 60 years, initially to attract capital for the mining and oil and gas sectors. In 1996, flow-through shares were extended to corporations with renewable energy and energy conservation businesses. By renouncing qualifying tax expenses, corporations that have issued flow-through shares to investors can transfer eligible tax expenses to investors if they are unable to use those tax benefits. Only Canadian Renewable Conservation Expenses (CRCE) are eligible for flow-through share treatment.

CRCE covers fully deductible expenditures associated with the start-up of renewable energy and energy conservation projects where at least 50 per cent of the capital cost incurred for the projects pertains to equipment described in Classes 43.1 and 43.2 in the Income Tax Regulations. Contrary to the capital expenditures eligible for the Accelerated Capital Cost Allowance, the CRCE covers the expenses not considered capital expenditures. For example, eligible expenses include costs associated with design and engineering, feasibility studies, permitting and site preparation. These expenditures may be deducted in full in the year incurred or can be carried forward indefinitely.

Comments

Flow-through shares are a powerful tool, especially for start-up companies with no or insufficient taxable profits to utilize eligible tax expenditures. However, the FTS mechanism is only available for expenditures associated with the development and start-up of renewable energy and energy conservation projects. By expanding the eligibility of cleantech projects – beyond renewable energy, energy conservation, development and start-up expenses – the FTS mechanism could be a powerful tool to unlock private capital and make Canada a global cleantech leader.

CHINA

China has well-established tax programs focused on sustainability. At the national level, China focuses on three environmental protection areas. These include pollution reduction, greenhouse gas reduction and resource conservation. China has implemented multiple

tax incentives focused on these environmental protection areas and utilizes different mechanisms, including reduced corporate income tax rates for certain businesses or for specific revenue sources, increased value added tax (VAT) refunds, and various other tax exemptions.

To reduce pollution, China has launched the Environmental Protection Tax (EPT). The EPT was launched in 2018 and is levied on the emission of four categories of pollutants: gas, water, solid waste, and noise.

A carbon emissions trading system was recently established to reduce greenhouse gas emissions. In addition, China is also considering introducing a carbon tax to help China achieve its goal to reach its peak carbon emissions by 2030 and carbon neutrality by 2060.

Tax Incentives

R&D Expense Super Deduction

In 1996, to incentivise R&D, China introduced an R&D expense super deduction for corporate income tax purposes. This super deduction allowed state-owned and collectively owned industrial enterprises to deduct 150 per cent of all qualifying R&D expenditures incurred. Subsequently, the R&D expense super deduction was increased to 175 per cent and expanded to most enterprises. In March 2021, the 175 per cent R&D super deduction was extended until December 2023 and increased to 200 per cent for manufacturing enterprises. The new rules also allow enterprises to "pre-claim" the R&D super deduction for the first half of a taxation year.

Patent Box / Reduced Corporate Income Tax

Eligible technology income can be exempt or subject to a reduced corporate income tax rate. A resident enterprise's eligible technology income is exempt from corporate income tax if its eligible technology income is RMB 5 million or less. Eligible technology income exceeding RMB 5 million is 50 per cent exempt. Eligible technology includes patents, computer software, copyrights, integrated circuits layout designs, new species of plants, biopharmaceutical products, and exclusive technology use rights for at least five years.

China also offers a reduced 15 per cent – as opposed to the general 25 per cent – corporate income tax rate to taxpayers eligible for the Technologically Advanced Service Company (TASC) and the High and New Technology Enterprise (HNTE) status. TASC and HNTE refer to companies with advanced technologies and personnel qualified to produce technologically advanced products or provide technologically advanced services.

Tax Holiday

Income from environmental protection or water and energy conservation projects is eligible for a full tax exemption for the first three years and a 50 per cent tax reduction for the following three years.

A taxpayer with HNTE status and newly established in one of China's five Special Economic Zones or the Shanghai Pudong New Area may be entitled to a two-year tax holiday and a three-year 50 per cent taxable income reduction from the first year in which it generates taxable income.

FRANCE

France is an EU member state, and its environmental policies are significantly influenced by the EU. The EU's environmental policies are driven by the European Green Deal, the EU's progressive plan to make its economy sustainable.

In recent years, France has been expanding its sustainability-focused legislation rapidly. France passed an important energy and climate law in 2019 and has set ambitious environmental goals such as carbon neutrality by 2050 and a 40 per cent reduction in fossil fuel consumption by 2030 compared to 1990 levels. In May 2021, France's National Assembly approved a wide-ranging climate bill that will prevent future airport expansions, prohibit open-air terrace heaters and dramatically reduce packaging waste.

The French environmental tax system is a behavior-based tax system. It aims to change the behavior of companies and households by taxing the activities and products deemed to be the most harmful and by exempting the green economy. The sale of high-carbon emitting vehicles will be banned by 2030 and a subsidy is available for electric bicycles.

There are multiple taxes on energy consumption and transportation. Energy taxes also have a significant carbon component. France has a carbon tax as well as a carbon emissions trading system.

At the national level, France has had sustainability tax programs since the 1990s with multiple incentives including income tax credits, accelerated depreciation and alternative funding.

Tax Incentives

R&D Tax Credits

Corporate taxpayers are entitled to a 30 per cent tax credit on eligible R&D expenses for the first EUR 100 million of qualified R&D expenses incurred during the tax year. R&D expenses exceeding EUR 100 million benefit from a 5 per cent tax credit. Qualifying R&D expenses include amortization of fixed assets, employee expenses and operating expenses. The R&D tax credit can be offset against the corporate income tax liability for the year of application and the next three years. A refund is available if the R&D tax credit cannot be utilized after three years.

Accelerated Depreciation

Plant, equipment and tools mainly used for R&D may benefit from accelerated depreciation. Depending on the standard amortization period, for tax purposes, the standard amortization of eligible plant, equipment and tools may be accelerated by a factor of 1.5, 2, or 3. The plant, equipment and tools must be primarily used for R&D activities eligible for the R&D tax credit.

Patent Box

Subject to certain conditions and on an election basis, French corporations can benefit from a 10 per cent corporate income tax rate applicable to income (after deducting R&D expenses) from licensing of qualifying patents, intellectual property or software. The same tax treatment applies to the income from sublicensing qualifying patents, and to gains derived from the sale of qualifying patents, provided that the qualifying patents have not been acquired within the last two years.

GERMANY

As an EU member state, Germany's sustainability policies and programs are also significantly influenced by the European Green Deal, the EU's sustainable economy plan.

Germany's environmental tax programs are well-developed. In addition to tax incentives, Germany also has multiple grant and rebate programs for the purchase of qualifying goods. Most of Germany's environmental tax programs are federal programs, as opposed to state level programs. Germany continues to add additional programs and frequently adjusts its programs to keep up with technological progress, newly emerging environmental needs and rapidly evolving EU legislation.

In 2021, Germany implemented a carbon emissions trading system (ETS) for fuels used in the building and transport sectors. The German ETS will expand to all fuels in 2023. The implementation of the ETS is part of the German Climate Protection Program 2030, under which Germany commits to reducing its greenhouse gas emissions by 55 per cent by 2030, moving away from coal, improving the energy efficiency of its buildings and stimulating climate-friendly mobility. Germany has several additional fuel and environmental taxes. Currently the German federal government is focused on carbon pricing, renewable energy and fuel taxes.

Tax Incentives

R&D Tax Credits

Germany has an extensive grant system to encourage R&D activities. Given the climate goal of the EU and Germany to be net-zero by 2050, there is a shift towards funding programs in the thematic areas of sustainability and decarbonization that combine funding of R&D and investment in green technologies and solutions.

To further encourage R&D activities, the German federal government enacted a law on tax incentives for research and development at the end of 2019. The law introduced an R&D tax credit and came into force on January 1, 2020. Taxable companies carrying out R&D activities can receive up to EUR 1 million per year per company group for R&D projects, regardless of company size or industry. The amount will be credited against the tax liability or paid in cash if the tax credit exceeds the tax liability.

Qualifying R&D projects must meet the R&D definition under the EU state aid rules. Under these rules, eligible R&D activities need to be classified either as basic research, industrial research or experimental development. Product development and routine R&D are not eligible.

Three types of R&D projects qualify: a company's own R&D projects, cooperative projects (for example, projects with technology providers) and contract research. Contract research is funded at the level of the customer and is only permissible if the R&D contractor is based in the EU or the European Economic Area (EEA).

The R&D tax credit amounts to 25 percent of eligible expenses. Eligible expenses only include direct R&D personnel costs and an employer's social security contributions. For contract research, the 25 per cent R&D tax credit is applied on 60 per cent of the contract value.

IRELAND

Ireland's climate policies are also heavily influenced by the EU.

At the national level, Ireland has a long history of introducing environmentally focused tax measures. For example, in 2002 Ireland introduced a plastic bag tax, which led to a 90 per cent decrease in the use of plastic bags. Ireland introduced a carbon tax in 2010. In addition to environmental taxes, Ireland has several sustainability focused incentive programs. Its environmental tax and incentives measures are continuing to evolve and are steadily increasing in importance.

In March 2021, the Irish government approved a new climate bill, the Climate Action and Low Carbon Development Bill. In addition to climate objectives, this bill has biodiversity and other sustainability objectives. Using carbon budgets that will place a ceiling on the amount of greenhouse gases each economic sector can emit, Ireland's government is committed to reducing greenhouse gas emissions by 7 per cent per year starting in 2021, which will result in a greenhouse gas emissions reduction of 51 per cent by 2030. Ireland also has a 2030 target to supply 70 per cent of its electricity demand with renewable energy sources and a 2050 net-zero greenhouse gas emissions target. To support these targets, Ireland's 2021 national budget increased the level of its carbon tax to EUR 33.50 and increased the carbon price target to EUR 100 per ton by 2030. The 2021 budget also included several other environmental tax measures.

Tax Incentives

R&D Tax Credit

Ireland has an R&D tax credit regime that provides for a 25 per cent tax credit for expenditures on qualifying R&D activities. The 25 per cent tax credit is in addition to the 12.5 per cent corporate tax deduction for these R&D expenses. Any excess R&D tax credits may be carried back for a period of one year, while excess R&D tax credits may be carried forward indefinitely. If the corporate tax liability does not exceed the available R&D tax credit, a cash refund may be available over a 33-month period.

Qualifying R&D expenses include salary costs, expenditures incurred directly on R&D materials, subcontracted expenditures, and general overhead expenditures to the extent that it can be demonstrated that they directly support the company's R&D activities. In addition, plant and equipment used in the R&D activities also qualify as R&D expenses for the R&D tax credit.

Ireland is planning to enhance its R&D tax credit regime that will see the R&D tax credit rate increase from 25 per cent to 30 per cent for small and micro-sized companies. This enhancement has not been enacted yet, as it is subject to EU state aid approval.

A 25 per cent tax credit is also available for expenditures on the construction or refurbishment of buildings or structures used for R&D activities. This credit adds to any industrial buildings allowances that may be available. The credit is first used to reduce the current-year and prior-year corporate income tax liabilities. Any excess R&D tax credit can be carried forward indefinitely. If the corporate income tax liability does not exceed the available R&D tax credit, a cash refund may be available over a 33-month period.

Tax Attribute Transfers

The R&D tax credit regime allows a company to reward its key R&D employees, who perform at least 50 per cent of their duties in the "conception or creation of new knowledge, products, methods and systems," by transferring part of its R&D tax credit.

Part of the R&D tax credit that the company could have used to reduce its corporate tax liability can be allocated to a key R&D employee. Subject to certain conditions, the key R&D employee incentive will effectively allow employees engaged in R&D to claim a credit equal to the amount surrendered by the employer against their income tax. If an employee cannot use the credit in full, it may be carried forward indefinitely until it is used or the employee leaves the company.

The employee claiming the incentive must not be a director or an individual who holds a 5 per cent or more interest in the company or an associated company.

Accelerated Depreciation

Tax depreciation allowances are available with respect to capital expenditure incurred during the course of scientific research. The allowance is equal to 100 per cent of the amount of the capital expenditure incurred and is fully deductible in calculating taxable profit.

Patent Box

Ireland recognizes the importance of R&D tax credits as part of the overall tax framework to attract foreign direct investment and enable Ireland to compete with other countries. To further reward and encourage local innovation activities, Ireland introduced the Knowledge Development Box (KDB) in 2015. The KDB is the first patent box regime that is compliant with the OECD guidelines set out in Action 5 of the OECD's Bases Erosion and Profit Shifting action plan.

The KDB offers a 6.25 per cent effective tax rate for profits arising from qualifying intellectual property assets. The main categories of qualifying intellectual property assets are patents – including patents pending – and copyrighted software. The KDB's 6.25 per cent effective tax rate results from a 50 per cent deduction from qualifying profits. Small and medium enterprises can access the KDB in respect of certain intellectual property assets without the need for the intellectual property to be patented.

JAPAN

In October 2020, Japan's government announced its ambition to be net-zero by 2050. Tackling climate change is not a partisan issue in Japan. In November 2020, both houses of Japan's parliament declared a climate emergency. In April 2021, Japan's prime minister announced that Japan will strive to cut its greenhouse gas emissions by 46 per cent – from 26 per cent – by 2030 from 2013 levels. As a result, a significant acceleration of new carbon-related policy measures – including a more substantial carbon tax – is expected.

Japan's sustainability-related tax programs are still emerging. A new corporate tax incentive to encourage investment in qualifying decarbonization activities was introduced in March 2021 as part of a 2021 tax reform proposal. Eligible investments approved before March 31, 2024, may benefit from either a 5 or 10 per cent investment tax credit or from 50 per cent accelerated depreciation. Currently, Japan has sustainability incentives in the form of tax credits, enhanced depreciation, grants or rebates.

Japan has a national carbon tax that applies to carbon dioxide emissions from all fossil fuels. A national emissions trading system (ETS) has been under consideration since 2008. It is increasingly likely that Japan will implement an ETS in the near future. Two regional ETSs exist in Japan that

apply to carbon dioxide emissions resulting from energy use by the industry, power and building sectors. Japan also has multiple fuel taxes.

Tax Incentives

R&D Tax Credits

Japan has two types of R&D based tax credits: a tax credit for general R&D expenses and a tax credit for special open innovation R&D expenses. The tax credit for general R&D expenses can be used up to 25 per cent of the corporate tax liability (35 per cent under a two-year temporary measure). The tax credit for special open innovation R&D expenses can be used up to 10 per cent of the corporate tax liability. As a result, a corporate taxpayer may be able to claim a combined R&D base credit up to 35 per cent (45 per cent) of its corporate tax liability. Japan's 2021 tax reform increased the combined available R&D base credit to 40 per cent (50 per cent).

The tax credit for general R&D expenses is the amount of general R&D expenses multiplied by an R&D expense ratio that encourages increased spending on R&D. The R&D expense ratio compares current R&D expenses with average R&D expenses over the last three years. The R&D credit ratio must be between 6 and 10 per cent (14 per cent under a two-year temporary measure). Japan's 2021 tax reform expands the lower limit of the R&D credit ratio from 6 per cent to 2 per cent and keeps the 14 per cent upper limit as an interim measure for financial years starting before March 31, 2023.

Eligible R&D expenses include the cost of material; salaries, wages and other related expenses of employees who have expert knowledge and skills and are engaged exclusively in experimental and research work; and a depreciation allowance for machinery and equipment used for such work.

The tax credit for the special open innovation R&D expenses regime aims to enhance innovation in Japan. In general, these are expenses incurred in joint research with, or outsourced to, special R&D institutions or universities. The tax credit rate for joint or outsourced research is 30 per cent.

R&D tax credits are not refundable and excess credits cannot be carried forward back.

As mentioned, Japan's 2021 tax reform also introduced a new measure to promote carbon neutrality. Under this measure, corporate taxpayers are entitled to a tax credit of 5 to 10 per cent or a special depreciation of 50 per cent on the acquisition cost of qualifying facilities.

Accelerated Depreciation

Eligible investments in qualifying decarbonization activities, which are approved before March 31, 2024, can benefit from a 50 per cent accelerated depreciation. This measure was introduced in March 2021 as part of the 2021 tax reform proposal.

Investment Tax Credits

An investment tax credit for investments in decarbonization projects was also introduced via the 2021 proposal. Eligible investments in qualifying decarbonization activities, which are approved before March 31, 2024, can also benefit from a 5 or 10 per cent investment tax credit. The tax credit can be used for up to 20 per cent of the corporate income tax liability and applies on a combined basis with the tax credit for special measures to promote digital transformation.

THE NETHERLANDS

The Netherlands has committed to reducing greenhouse gas emissions by 49 per cent by 2030 compared to 1990 levels. The Netherlands has not committed to net-zero by 2050 – it will reduce its greenhouse gas emissions by 95 per cent by 2050. These climate goals were formalised in the Climate Act of May 28, 2021. The Climate Plan, the National Energy and Climate Plan (NECP) and the National Climate Agreement contain the policies and measures required to achieve these climate goals. As an EU member state, the Netherlands is required to submit the Climate Plan and the NECP to the European Commission. The National Climate Agreement is an agreement between the Dutch government and the high-emitting Dutch industry sectors about the actions these industry sectors will take to achieve the Dutch climate goals.

To meet its climate goals, the Netherlands has introduced a national tax on carbon emissions in addition to the EU ETS. Effectively, the national carbon tax sets a minimum price for carbon emissions compared to the price charged under the EU ETS. The carbon price for 2021 is EUR 30 per ton, increasing to EUR 125 per ton in 2030. Generally, carbon dioxide emitting companies that are subject to the EU ETS are also subject to the new Dutch carbon tax.

The Netherlands has a comprehensive set of environmental taxes and levies, and new climate change-related measures continue to emerge. Initially, Dutch environmental taxes were primarily focused on energy and fuel consumption. More recently, the government has been focusing on greenhouse gas emission reductions and other environmental objectives such as reducing the use of plastics.

Tax Incentives

R&D Tax Credits

Companies conducting qualifying R&D activities on applied new technology are entitled to a tax credit in the form of a reduction of wage tax to be paid on wages of employees engaged in R&D of technologically new products.

The calculation of the amount of the R&D tax credit is based on salary costs and other R&D costs and expenses. In 2021, the R&D tax credit amounts to 40 per cent of the first EUR 350,000 of qualifying R&D expenses and 16 per cent of R&D expenses exceeding this amount. Start-ups are entitled to an R&D tax credit of 50 per cent of the first EUR 350,000 of R&D costs. The maximum benefit cannot exceed the total amount of wage tax due. Instead of claiming the R&D tax credit based on actual R&D costs and expenses, a taxpayer may claim the R&D tax credit based on a fixed amount per R&D-hour spent. The fixed amount is EUR 10 per hour for the first 1,800 R&D-hours and EUR 4 for every R&D-hour exceeding 1,800 hours.

The budget for this R&D tax credit is fixed, so the amount of the tax credit is dependent on budget availability.

Super-Deduction for Investment in Energy Efficient and Environment Improving Business Assets

For investments in new energy-efficient business assets that meet the "Energy List" requirements, an additional deduction from corporate taxable income (EIA) is available. The minimum investment amount per asset is EUR 2,500. The additional deduction equals 45.5 per cent (2021) of the annual investment amount in eligible energy-efficient assets, with a maximum of EUR 126 million (2021).

For investments in new environment improving business assets that meet the "Environment List" requirements, an additional deduction from corporate taxable income is available. The minimum investment amount (MIA) per asset is EUR 2,500 euro. Depending on the classification of the asset, the additional deduction equals 36 per cent, 27 per cent, or 13.5 per cent of the annual investment amount in eligible environment improving assets, with a maximum of EUR 25 million.

Patent Box

The Netherlands has a beneficial corporate income tax regime for profits, including royalties, derived from self-developed intangible assets. To qualify, the intangible assets must have been developed after December 31, 2006. This self-developed intangible asset regime is called the Innovation Box. Corporate taxpayers qualifying for the Innovation Box regime, are entitled to a lower effective rate on taxable profits derived from these intangible assets. As of January 1, 2021, the effective tax rate of the Innovation Box is 9 per cent (increased from 7 per cent).

The Innovation Box is applicable if at least 30 percent of the profits have been derived from qualifying intangible assets. Companies that have incurred certain qualifying R&D expenses for the development of intellectual property for which no patent was obtained are also entitled to the favourable effective tax rate of the Innovation Box.

The lower effective tax rate only applies to positive income, allowing innovation losses to be accounted for in full at the general corporate income tax rate of 25 per cent (15 per cent for taxable profits up to EUR 245,000).

The Dutch Innovation Box regime is aligned with the "modified nexus" approach as described in the OECD guidelines set out in Action 5 of the OECD's Bases Erosion and Profit Shifting action plan and is considered as non-harmful by the EU Code of Conduct Group.

THE U.K.

The U.K. has well-established sustainability tax programs. The U.K. was an early adopter of tax measures as a means to fight climate change. For example, in 2001, the U.K. introduced the Climate Change Levy (CCL), a tax on energy used by most users other than households and the transport sector. The CCL caused a behavioural change away from coal-fired power generation. In 2005, the U.K. was a founding EU member state of the EU emissions trading scheme (ETS) – the carbon price under the EU ETS was underpinned by a carbon price floor. The U.K. environmental measures are predominantly national, although some environmental measures differ between England, Wales and Scotland. Scotland, for example, has a more ambitious carbon emissions reduction target than the U.K.

With the U.K.'s exit from the EU, the U.K. has introduced its own ETS which has generated a carbon price that is currently slightly above the EU carbon price. Other environmental measures in the U.K. include the CCL, various fuel duties and other environmental taxes, with a new plastic packaging tax coming into force in 2022. Further tax measures and benefits should be expected.

Tax Incentives

R&D General

Currently, in the U.K., two forms of tax relief are available to companies for qualifying R&D expenses (the current R&D tax relief system is under review). For small and medium sized businesses, a super deduction is available for qualifying R&D expenses (SME relief). The super deduction is equal to 230 per cent of qualifying R&D expenses. Also, a taxable research and development expenditure credit (RDEC) is available equal to 13 per cent of qualifying R&D expenses. The RDEC is primarily targeted at larger companies, although small and medium sized businesses can also apply the RDEC instead of the super deduction.

Both the SME relief and the RDEC use the same definition of R&D expenses. Generally, R&D expenses are defined by reference to activities that are treated as R&D under U.K. generally accepted accounting practice (GAAP).

R&D Super Deduction

Under the SME relief rules, small and medium sized businesses can deduct an additional 130 per cent of qualifying R&D expenses when calculating their taxable profits or losses. Effectively, this provides a deduction of 230 per cent of qualifying R&D expenses, as a 100 per cent deduction for R&D expenses is already allowed under normal corporate income tax rules. Other R&D grants or subsidies will restrict the availability of SME relief which is capped on an R&D project by project basis.

If an SME is not profitable enough to absorb the 230 per cent super deduction, it has the option of surrendering all or part of the super deduction in exchange for receiving a cash payment. The cash payment is capped at 14.5 per cent of the amount surrendered. With a corporate income tax rate of 19 per cent (rising to 25 per cent from April 2023), generally, the cash payment will be less than the tax savings if the surrendered amount is carried forward to be set off against future taxable profits, unless the SME is cashflow constrained.

R&D Tax Credits

In contrast to the SME relief, the RDEC – 13 per cent of eligible R&D expenses – uses a different method of calculating corporate income tax relief for R&D expenses. Generally, the RDEC can be characterized as an "above-the-line" R&D tax credit for R&D related expenses (as opposed to R&D capital expenditures). Effectively, this means that the RDEC is a taxable tax credit – the RDEC is included in the taxable income of the recipient. In certain limited circumstances, a cash payment in leu of the 13 per cent taxable R&D tax credit may also be available.

Accelerated Depreciation

Under the U.K.'s Research and Development Allowance (RDA), qualifying R&D related capital investments are eligible for a first-year accelerated depreciation of 100 per cent of the amount invested in qualifying expenditures. Qualifying expenditures include investment in plant, machinery and buildings (but not land) used for the purposes of carrying out R&D activities. The RDAs give businesses an accelerated depreciation rate in the accounting period in which the capital investment is made.

Patent Box

The U.K.'s patent box is a 10 per cent corporate income tax regime that can be claimed by companies that have patented products or processes, developed by the company. It is applicable to patent related profits and applies for the life of the patent.

The patent box regime is available to U.K. companies that hold or exclusively license U.K., EU or qualified EEA patents. The regime cannot be accessed by holding rights such as copyrights, trademarks or designs.

The patent box company, or a group member, must have created, or significantly contributed to, the creation of the patented invention or have performed a significant amount of activity to develop the patented invention, any product incorporating the patented invention or any process incorporating the patented invention. If a group member has performed the development activity, the patent box company must be actively managing the resultant patent rights.

THE U.S.

Political leadership from the U.S. is critically important to successfully fight climate change. Unfortunately, that leadership has been on and off again. In 1997, President Bill Clinton signed the Kyoto Protocol, the first global agreement to reduce greenhouse gases. Unfortunately, in March 2001, President George W. Bush announced that the U.S. would not implement the Kyoto Protocol. In 2015, the U.S. joined the fight against climate change again when President Barack Obama signed the milestone global climate change treaty, the Paris Agreement. Subsequently, in 2016, President Donald Trump announced that the U.S. would withdraw from the Paris Agreement. That withdrawal was reversed by President Joe Biden on his first day in office. President Biden has moved quickly to emphasize the commitment of the U.S. to play a leadership role again in fighting climate change.

Despite its on-again-off-again climate change leadership role, the U.S. has well-established green incentives for renewable energy, fleet decarbonization and energy-efficiency at both the federal and state level. Regulatory measures are established mainly at the state level, whereas incentives can be found at both the federal and state level. Several states have implemented or are considering an ETS or a carbon tax. Carbon pricing at the federal level remains unlikely, despite President Biden's support for the concept of a carbon border adjustment.

The U.S. sustainability measures are mainly focused on fuel taxes; rebate and grant programs; performance-based and green building incentives; fleet decarbonization and electrification; corporate tax credits for renewable energy and alternative fuel production; and carbon capture and storage.

Tax Incentives

R&D General

A non-refundable tax credit is available for certain qualified research expenses (QREs) incurred in the U.S. that exceed one of two computed base amounts. This tax credit may be used by a business to reduce its federal tax liability. A 100 per cent deduction is also allowed for R&D expenses other than expenses associated with the acquisition of depreciable property, such as buildings and equipment. However, if a taxpayer claims both the research tax credit (IRC Section 41) and the 100 per cent deduction (IRC Section 174), certain limitations on these benefits will apply.

QREs eligible for the research tax credit are a subset of the expenses eligible for the 100 per cent deduction, as QREs are generally measured as direct expenses of R&D without including overhead expenses or indirect expenses. QREs generally include wages, supplies and a portion of contract or third-party expenses incurred in the U.S.

R&D Tax Credits

Federal and state research tax credits for QREs incurred in the U.S. can be used by a business to reduce its federal and state tax liabilities. In general, the federal tax credits are non-refundable, while some state tax credits are refundable. In addition, some state tax credits may have the potential to be purchased or sold by the taxpayer.

The federal research tax credit is designed to reward a business for performing research in the U.S. and for increasing its spending on research. Therefore, a taxpayer must calculate the increase of its current-year QREs over a computed base amount to be able to claim the research tax credit. A taxpayer can use one of two methods to calculate the research tax credit: the "regular credit" and the "simplified credit."

Under the regular credit method, a taxpayer will be entitled to a tax credit if it is increasing its QREs as a percentage of gross receipts measured against a historic reference period. The maximum benefit in tax savings for the regular credit is about 7.9 per cent of a taxpayer's QREs. Under the simplified credit method, the credit is generally equal to 14 per cent of a taxpayer's increase in QREs in the current year, over 50 per cent of the average QREs for the prior three years.

In general, the research tax credit is limited to a maximum of 25 per cent of the taxpayer's regular tax liability. Unused research credits may be carried back for one year and carried forward for 20 years.

R&D Expense Deduction

A 100 per cent tax deduction is permitted for R&D expenses for federal and state tax purposes. There are special rules for applying this deduction to prototypes or component parts of a prototype. Amounts defined as "specified research or experimental expenditures" must be capitalized and amortized over a five-year period. Expenditures attributed to research that is conducted outside the U.S. must be capitalized and amortized over a 15-year period. Specified research or experimental expenditures include internally developed software.

Renewable Energy Investment Tax Credit (Commercial and Residential)

The U.S. has a federal income tax credit for investments in qualifying renewable energy projects (commercial projects: IRC Section 48, and residential projects: IRC Section 25D). Investment tax credits are available for investments in solar equipment, fuel cells, small wind energy property (100 kilowatts or less), offshore wind, fibre-optic solar, geothermal projects, combined heat and power property, geothermal heat pump property and microturbines. Under this investment tax credit (ITC), owners of qualifying energy projects can claim a tax credit of up to 26 per cent of the project's capital costs. The ITC vests rateably over a five-year period. If a project is sold within the five-year period, the unvested portion of the ITC is subject to recapture.

Under current law, the amount of the ITC varies depending on the type of technology used in the project to generate renewable energy and when that project begins construction. For example, taxpayers can claim an ITC of:

- 26 per cent if they start construction on their eligible solar projects during 2021 and 2022
- 22 per cent if they start construction on their eligible solar projects during 2023
- 10 per cent if they start construction on their eligible solar projects after December 31, 2023 (the 10 per cent ITC is permanent for commercial projects, but the ITC for residential projects drops to 0 per cent)

Renewable Energy Production Tax Credit

Dating back to 1992, the renewable energy production tax credit (PTC) is a ten-year, inflation adjusted, U.S. federal income tax credit for each kilowatt hour (kWh) of electricity generated by certain types of renewable energy projects, provided certain conditions are met. The PTC is available for investments in wind, biomass, geothermal, landfill gas, municipal solid waste, hydropower, and marine and hydrokinetic facilities. When the PTC was originally established, it was only available if the qualifying project was placed in service by a specified date. However, the eligibility requirement was changed in 2013 from a placed-in-service date to a start-of-construction date.

This PTC has been allowed to expire multiple times but was most recently extended under the Taxpayer Certainty and Disaster Tax Relief Act of 2020 (part of the Consolidated Appropriations Act, 2021).

The inflation-adjusted credit is equal to:

- 2.5 cents per kWh on the sale of electricity produced from the qualified energy resources of wind, closed-loop biomass and geothermal energy
- 1.3 cents per kWh on the sale of electricity produced in open-loop biomass facilities, small irrigation power facilities, landfill gas facilities, trash facilities, qualified hydropower facilities, and marine and hydrokinetic renewable energy facilities

Eligible wind projects can claim:

- 100 per cent of the PTC if they started construction before January 1, 2017
- 80 per cent of the PTC if they started construction before January 1, 2018
- 60 per cent of the PTC if they that started construction before January 1, 2019
- 40 per cent of the PTC if they started construction before January 1, 2020
- 60 per cent of the PTC if they start construction between January 1, 2020 and December 31, 2021

There is no PTC for projects that start construction on or after January 1, 2022. Having said that, in President Biden's US$ 3.5 trillion budget proposal for the coming fiscal year (Budget), the Budget proposes extending both the "production tax credit" and the "investment tax credit," for the production of clean energy and investment in clean energy facilities, respectively. Additionally, the Budget includes a 30 per cent credit (or cash in lieu of a credit) for investment in qualifying electric power transmission property placed in service after December 31, 2021, and before January 1, 2032. Other incentives being contemplated include providing credits for investments in low-carbon hydrogen as a fuel source, the production of energy at existing nuclear facilities, and the expansion and enhancement of credits for carbon capture facilities.

Accelerated Depreciation

Apart from tax credits, most of the equipment used in renewables projects qualifies for depreciation over an accelerated five-year period. Certain renewable energy assets may alternatively qualify for immediate (100 per cent) depreciation in the year in which the equipment is placed in service.

Carbon Capture Utilization and Sequestration Production Tax Credit

The U.S. federal government provides tax credits to taxpayers that capture and store or use carbon dioxide and carbon oxide (IRC Section 45Q). Initially introduced in 2008, IRC Section 45Q provided a US$ 20 tax credit per metric ton for carbon dioxide that is permanently sequestered (removed from the atmosphere). The tax credit was initially capped at 75 million metric tons, and the IRS reported that in 2014, only 35 million metric tons had been claimed. The 45Q tax credit was recently updated and expanded, increasing the benefit to US$ 50 per metric ton of carbon dioxide and carbon oxide permanently sequestered.

The purpose of IRC Section 45Q is to incentivize investment in carbon capture utilization and storage (CCUS) projects. Since its enactment in 2008, the 45Q tax credit has been expanded several times, most recently at the end of December 2020. Investors have responded positively to

the 45Q tax credit, which could help unlock significant and much needed investment in CCUS in the future.

In 2018, several important changes were made to the 45Q tax credit that made these credits more attractive to investors. The 45Q tax credit was expanded to cover both carbon dioxide and carbon oxide. It eliminated limits on the overall credits available in the market and for some types of taxpayers, and it lowered thresholds for the amount of carbon that would have to be captured in a given year.

It also provided more certainty to investors by clarifying that 45Q tax credits would be available for 12 years, beginning when the carbon capture equipment is placed in service. Most importantly, it increased the value of 45Q tax credits.

Further, in December 2020, the Taxpayer Certainty and Disaster Tax Relief Act of 2020, extended the Section 45Q tax credit to projects that begin construction prior to January 1, 2026, extending by two years the original date of January 1, 2024.

Tax Attribute Transfers

In the U.S., unique project financing structures – tax-equity financing structures – are available that allow project developers unable to utilize certain tax attributes – such as tax credits – to transfer these tax attributes to investors able to utilize them. Tax-equity financing broadly encompasses investment structures in which a passive equity investor looks to achieve a target internal rate of return based primarily on U.S. federal income tax benefits derived from an investment in a particular asset. Tax-equity investors are typically profitable tax-paying entities such as banks, insurance companies, certain utilities and general corporate entities. Tax-equity investors generally invest alongside a developer who cannot make efficient use of the tax benefits associated with the underlying asset. Tax-equity financing structures are driven by tax laws that are unique to the U.S.

Although infrastructure-focused federal income tax credits in the U.S. have traditionally been targeted to renewable energy projects, there has been a push in recent years to expand the tax credit regime to cover additional types of infrastructure such as carbon capture and sequestration, energy storage and transmission assets.

As discussed, the U.S. incentivises the investment in many renewable power projects with federal income tax benefits. These benefits include tax credits and the ability to write off the cost of a project on an accelerated basis. There are two general classes of tax credits available for renewable projects: investment tax credits and production tax credits. In addition, most of the equipment used in renewables projects qualifies for accelerated depreciation.

Project developers are often unable to make efficient use of these tax benefits themselves, but they can enter into what is effectively a bartering transaction with an investor who is able to make efficient use of these tax benefits – a tax-equity investor. Under this bartering transaction, the project developer will allocate nearly all the tax benefits to the tax-equity investor in exchange for cash capital contributions for the project.

Three tax-equity financing structures are used in the U.S. renewables market: the partnership flip, the inverted lease, and the sale-leaseback.

Partnership flips are the most common structure and are the only type of tax equity financing available for projects that qualify for the production tax credit. In a typical deal, the project developer either contributes or sells a project to a partnership formed between the project developer and the tax-equity investor. The tax-equity investor contributes cash to the partnership and is typically allocated 99 per cent of the tax benefits.

In basic inverted lease structures, which are only available for investment tax credit transactions, the project developer is the lessor and leases the project to a tax-equity lessee. A special rule for inverted leases allows the lessor to pass the investment tax credit on to the lessee. One of the benefits of the inverted lease is that it allows the parties to split up the tax benefits.

A third common tax-equity structure is the sale-leaseback. As its name implies, it involves the sale of a project by a project developer to a tax-equity investor, who simultaneously leases the project back to the project developer. This structure is also only available for investment tax credit transactions and the project owner – the tax-equity investor – is the only party entitled to the tax benefits.