Viresco Solutions

Possible Implementation Pathways for Wetlands and Grasslands as Carbon Management Tools

Discussion Paper

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Disclaimer

The following report is intended to present ideas for consideration and discussion and is not intended to be prescriptive. This report documents the carbon management and climate adaptation services of Alberta's wetland and grassland ecosystems. The report is a compilation of ideas and does not reflect the opinions of AB NAWMP, DUC or Viresco Solutions.

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2. Introduction

The business case for the retention and restoration of Alberta's wetlands and grasslands as critical biological carbon stores and sinks is clear. In addition to providing a myriad of cost-effective ecosystem services, including water quality improvements, flood and drought mitigation, socio-economic and recreational benefits, they sequester and store a substantial amount of carbon. Biological carbon stores represent an important natural capital asset and can play an important role in helping Alberta and Canada meet their national and international greenhouse gas (GHG) emission reduction targets. The significant benefits provided by the presence of these ecosystems on the landscape is recognised directly and indirectly in a number of provincial and federal priorities.

The Pan-Canadian Framework on Clean Growth and Climate Change (PCF) (Government of Canada 2017) outlines how Canada will achieve GHG emission reduction targets and achieve a low carbon economy, with biological offsets and green infrastructure key to achieving targets. Alberta's Climate Leadership Plan (CLP) outlines the province's contribution to reducing GHG emissions. The retention of existing healthy ecosystems, and restoration of historically lost or impaired ecosystems, aligns with the objectives of green infrastructure investment opportunities:

- aiding the implementation of the PCF
- reducing GHG emissions
- investing in clean and safe water and wastewater
- aiding adaptation to a changing climate and building resiliency.

Provincial priorities detailed in the Alberta Wetland Policy (AWP) reference the importance of ecosystem services by aiming to "conserve, restore, protect and manage Alberta's wetlands to sustain the benefits they provide to the environment, society and economy" (Government of Alberta 2013). The Land Use Framework (LUF) sets out three aims to achieve a healthy economy through management of healthy ecosystems and environment, while providing ample recreational and cultural opportunities (Government of Alberta 2008). There is clear alignment of wetland and grassland retention and restoration with the aims of the AWP, LUF and associated Regional Plans.

This report builds on the outcomes of the companion "Business Case" report to describe potential pathways to implement wetland and grassland retention and restoration activities, with the central intention of maintaining carbon stores, increasing biological carbon sequestration, and adapting to climate change.

3. Drivers/Opportunity

A substantial opportunity exists to implement projects and programs that achieve many provincial and federal priorities, in addition to a variety of ecosystem services that will benefit Albertans and transition to a low carbon economy.

The Government of Canada (GOC), and the Government of Alberta (GOA), highlight plans and priorities for clean growth and a low carbon economy through the Pan Canadian Framework on Clean Growth and Climate Change (PCF), and the Alberta Climate Leadership Plan (CLP). Key priorities in the PCF include the development of green infrastructure, GHG emission reductions, carbon sequestration, and enhancing adaptation/resiliency to climate change. The CLP does not explicitly address the use of green infrastructure to achieve these priorities, but could if properly positioned going forward[1]. The retention and restoration of Alberta's wetlands and grasslands can cost-effectively contribute to all of these priorities.

The development of green infrastructure is described in the PCF as, "*living natural infrastructure (e.g. constructed/managed wetlands and urban forests) [that] can build the resilience of communities and ecosystems and deliver additional benefits, such as carbon storage and health benefits*". Recognising the significant benefits of green infrastructure to achieving the priorities of the PCF, the GOC has dedicated $21.9 billion from the 2017 Budget to green infrastructure development, including $5 billion over 5 years to green infrastructure projects through the Green Infrastructure Fund (GIF) (Government of Canada 2017). The retention of existing healthy ecosystems, and restoration of historically lost or impaired ecosystems, aligns with the objectives of green infrastructure investment opportunities (Government of Canada 2017):

- aiding the implementation of the PCF
- reducing GHG emissions
- investing in clean and safe water and wastewater
- aiding adaptation to a changing climate and building resiliency.

The GOC has also committed to protecting, "*at least 17% of terrestrial areas and inland water … through networks of protected areas and other effective area-based conservation measures"* and to "*sustain [wetland] ecosystem services through retention, restoration and management activities*" as part of the UN Aichi Biodiversity Targets (CBD Secretariat 2017). The restoration and retention of wetlands and grasslands in perpetuity will assist Canada in meeting its Aichi conservation targets by 2020.

[1] In a personal communication, Andrew Leach, chair of the Panel, expressed he would like to understand the potential better, but did not have the time, capacity or resources to address this potential effectively in the CLP report timelines.

Wetland and grassland retention and restoration activities also align with provincial priorities described in the LUF and Regional Plans, through supporting a healthy economy, providing resiliency and adaptation to a changing climate, improving environmental health, and providing recreational and cultural opportunities (Government of Alberta 2008). Setting regional objectives for wetland and grassland retention and restoration in Regional Plans will further assist in achieving the aims of the LUF on regional and landscape scales (Government of Alberta 2017). A number of conservation and stewardship tools have been enabled under the Alberta Land Stewardship Act (ALSA) to achieve the aims of the LUF and Regional Plans (see section 10.4 in companion Business Case report).

The Alberta Wetland Policy (AWP) prioritises the avoided conversion of wetlands, with minimisation of functional impacts, and functional replacement required where wetland losses cannot be avoided. Wetland retention, minimisation of impacts, and restoration activities therefore align with the aims of the AWP (Government of Alberta 2013).

Caribou and many other species at risk rely on Alberta's varied wetland and grassland habitats. The Alberta Caribou Action Plan and Species at Risk Act (SARA) aim to retain and improve natural habitat and restore or replace previously lost habitat ranges through wetland and grassland retention, minimisation of impacts and restoration activities. (Government of Alberta 2016) (Government of Canada 2002).

Provincially-funded programs such as the Watershed Resiliency and Restoration Program (WRRP), Agricultural Watershed Enhancement Program (AWEP) incent the restoration of wetlands as natural infrastructure solutions to reduce the impacts of flood and drought events, and improve water quality. Wetland and grassland retention and restoration, and sustainable management, therefore align with the provincial priorities described and incented by the WRRP and AWEP.

Some of Alberta's key industries are coming under increased environmental scrutiny, and organisations are searching for ways to improve the sustainability of their operations, and gain public trust. There are a number of mechanisms highlighted in this report that facilitate private sector investments in environmentally beneficial projects. Both private sector and government priorities can therefore be achieved through the delivery of program(s) focused on retention and minimisation of impacts to Alberta's wetlands, the restoration of historically lost wetlands, and the retention, restoration, and effective management of Alberta's grasslands. The GOC and GOA's clear green agenda and financial support; the growing value of "green" investments and carbon offsets to the private sector; and the clear advantages of ecosystem retention to economic resilience and climate change mitigation and adaptation, create the opportunity to continue to support and enhance programming and partnerships in this area.

4. Current State

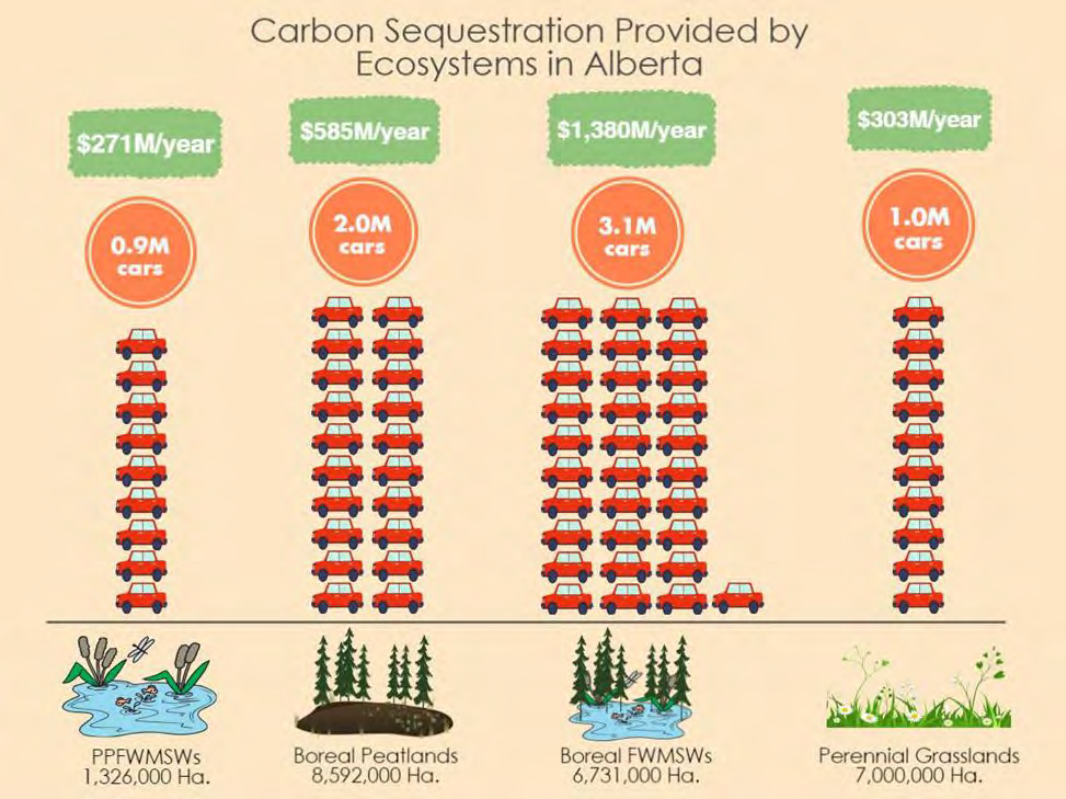

Figure 1: Annual Carbon Sequestration Provided by Alberta's Wetlands and Perennial Grasslands compared in terms of average passenger vehicle emissions, and the economic value of this ecosystem service (see text)

Estimates of the current functional wetland and grassland area in Alberta are presented in Figure 1. The estimated annual carbon sequestration services provided by Alberta's existing ecosystems are presented as equivalent GHG emissions from North American passenger vehicles, with an average value calculated using the predicted price of carbon to 2030 (US Environmental Protection Agency 2016) (Sawyer and Bataille 2017). It is clear that Alberta's wetlands and grasslands provide a valuable carbon sequestration service as well as a myriad of other ecosystem services (see *Section 9 in companion Business Case report*).

Physical and functional ecosystem losses in Alberta continue at varying rates and are difficult to monitor due to the scale of the landscape, nature of impacts, technical complexity in monitoring systems, and the dynamic nature of ecosystem health (PHJV 2014). Estimated figures for ongoing annual losses in Alberta are presented in Figure 2, alongside the estimated impacts on carbon management services.

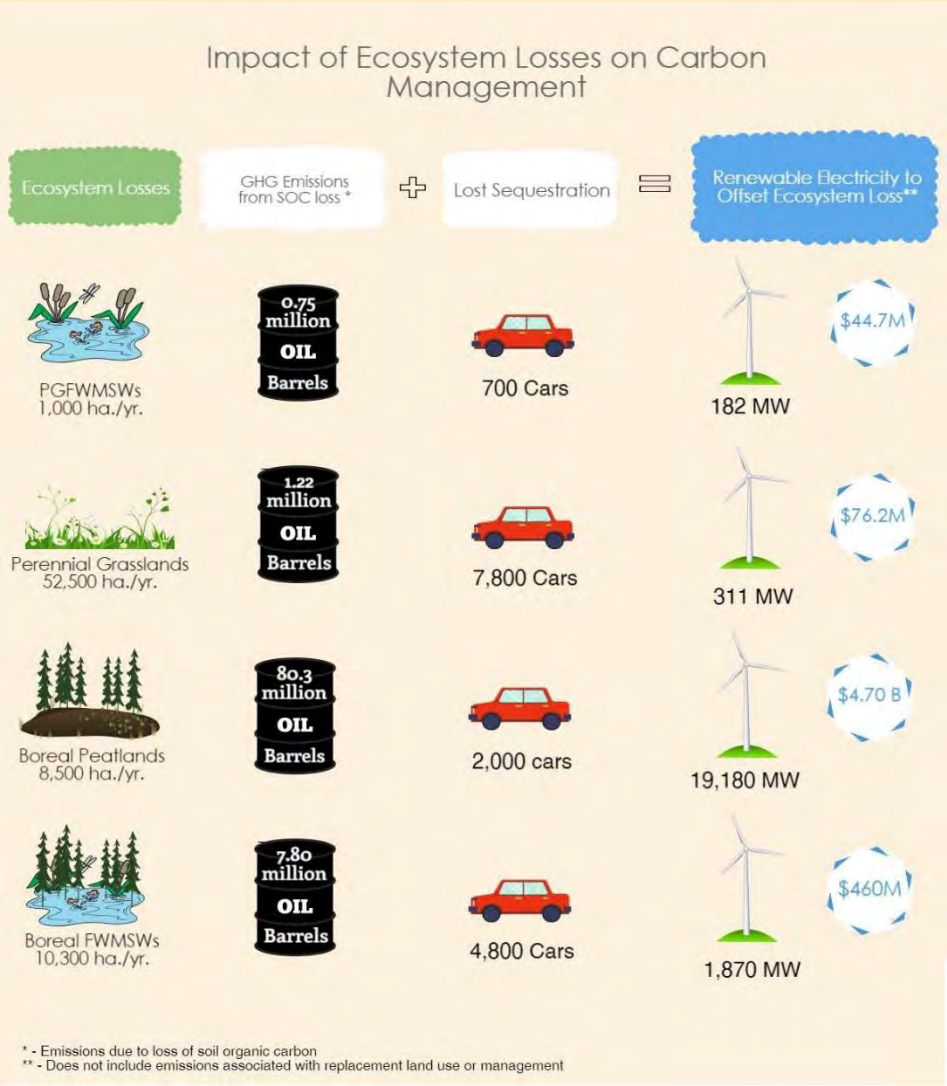

Figure 2: Impact of Estimated Ongoing Annual Ecosystem Losses on Carbon Management Ecosystem Services and Current GHG Emission Reduction Efforts in the Energy Sector, given in terms of no. barrels of oil combusted, no. of passenger vehicle emissions offset, and estimated investment in wind generation capacity required to offset carbon management service losses

Figure 2 shows the impacts of estimated ongoing annual ecosystem losses on the carbon management services they provide. Greenhouse gas emissions associated with the loss of soil organic carbon stores are represented as emissions from combustion of oil (barrels) (US Environmental Protection Agency 2016). The loss of carbon sequestration servicing is represented by the number of passenger vehicles' annual GHG emissions that would have been offset by the lost ecosystem (US Environmental Protection Agency 2016). The right-hand side gives an estimate of the additional Alberta wind electricity generation capacity required to offset the carbon management services (lost carbon soil organic stores and lost carbon sequestration) lost with ecosystem losses, together with an estimate of the total cost of installing the additional wind electricity generation capacity (AESO 2016).

It is clear that ongoing losses of each ecosystem type are having a substantial impact on both GHG emissions and carbon sequestration. The carbon management impacts of ongoing losses may be negating efforts and improvements in other sectors, such as the installation of renewable electricity generation.

There are a number of drivers for the ongoing loss of Alberta's wetlands and grasslands. Economic and market drivers are particularly influential, driving changes in the use of natural resources and land management. In particular it is expected that development will continue in the boreal natural subregion as it becomes more accessible to industry. While some physical boreal wetland losses are expected, minimisation of impacts to boreal wetlands during planning, development, and restoration/replacement of wetland losses through the AWP will be key to maintaining the functional capacity and carbon stores of boreal wetlands.

5. Desired state/Strategic Outcomes

This Implementation Roadmap identifies an overarching desired state, two high-level strategic outcomes and then a series of goals under each carbon management tool.
The overarching desired state is, in order of priority:

1. Existing wetlands and grasslands are retained and functional,
2. Where unavoidable, impacts on ecosystem functionality are demonstrably minimised and mitigated, with proper justification. Considering wetlands - the 3:1 mid-point mitigation ratio is strictly adhered to.
3. Measurable progress towards the functional replacement of historical ecosystem losses.

To that end, high-level strategic outcomes are:

- **Recognition of wetlands and grasslands as essential green infrastructure and carbon management tools** for meeting provincial, national and international priorities on GHG emissions and climate change adaptation, in addition to the many socio-economic and cultural co-benefits known to support GOC and GOA priorities and policies.
- **Inclusion of wetland and grassland ecosystems in the suite of measures** described in the Alberta Climate Leadership Plan towards reducing provincial carbon emissions and the transition to a low carbon economy.

5.1 Wetlands

For wetlands, the recommended goals to achieve the desired state and strategic outcomes above are:

1. Recognition that GHG emissions from the loss of SOC stores due to ongoing wetland losses and functional impairment may be negating efforts in other sectors such as the transition to renewable electricity generation.
2. Collaboration between federal and provincial governments, the private sector and industry, and NGOs, to develop and implement programs and projects to achieve the aims of each party, through partnerships, including green infrastructure development, GHG emission reductions, climate adaptation and resiliency, transition to a low carbon economy, biodiversity conservation, and achievement of conservation targets.
3. Inclusion of wetland objectives in the implementation of Regional Plans, as described in the South Saskatchewan Regional Plan, to proactively manage wetland retention and restoration on a regional scale.
4. Identification of boreal peatlands as particularly large carbon stores that are coming under increasing development pressure and will require research into, knowledge-exchange, and education on best practices to minimise functional and physical losses and GHG emissions.
5. Adoption of a carbon offset protocol for avoided conversion of, or functional impacts to, wetlands, or the inclusion of GHG emissions from wetland impacts/conversion in existing land-based carbon offset protocols in the ACOS.
6. Maintenance of the 3:1 mid-point functional replacement requirement of the AWP where physical and functional wetland losses cannot be avoided.
7. Encourage the development of a provincial wetland monitoring program to assess the state-of-the-environment and focus efforts to achieve the objectives of the AWP, LUF and Regional Plans.

5.2 Grasslands

For grasslands, the recommended goals to achieving the desired state and retention of Alberta's perennial grasslands, their sustainable management, and restoration of historical losses are:

1. Recognition that GHG emissions from the loss of SOC stores due to ongoing grassland conversion, development, and unsustainable land management may be negating efforts in other sectors such as the transition to renewable electricity generation.
2. Collaboration between federal and provincial governments, the private sector and industry, and NGOs, to develop and implement programs and projects to achieve the aims of each party, including green infrastructure development, GHG emission reductions, climate adaptation and resiliency, transition to a low carbon economy, biodiversity conservation and achievement of conservation targets.

3. Inclusion of grassland objectives in the implementation of Regional Plans, as described in the South Saskatchewan Regional Plan, to proactively manage wetland retention and restoration on a regional scale.
4. Adoption of a carbon offset protocol for avoided conversion of grasslands and/or sustainable grassland management.
5. Development of a provincial grassland monitoring program to assess the state-of-the-environment and focus efforts to achieve the grassland retention and restoration objectives of the LUF and Regional Plans.

6. Implementation Pathways

6.1 Government of Alberta

The GOA should be recognised for their commitment to preserving ecosystem services through the development of a number of policies, frameworks and programs in recent years, including the AWP, LUF/ALSA, Agricultural Watershed Enhancement Program (AWEP), Watershed Resiliency and Restoration Program (WRRP), and Caribou Action and Range Plans. More recently, the GOA has worked to initiate GHG emission reduction strategies. The GOA has also shown confidence in NGOs and collaborative partnerships to achieve positive environmental outcomes, for example through continued, long-term support for ABNAWMP and funding projects in the WRRP. The work that has already begun should continue and develop to further improve Alberta's environmental credentials and achieve provincial and federal priorities for a strong and resilient low-carbon economy.

6.1.1 Policy Alignment Opportunities

Alberta Wetland Policy

The AWP is a landmark policy tool for wetland conservation, with the primary objective of avoidance of impacts followed by minimisation and, where necessary, replacement. The AWP is supported by the Alberta Water Act, under which regulatory approval is required for any disturbance to a waterbody (including wetlands).

While the AWP does consider the wider, regional impacts of wetland loss through assessing relative abundance of wetlands on the landscape and historical losses, it is primarily a policy tool to manage approved developments; wetlands are only considered by regulators once a proponent requests permission to develop. Ephemeral wetlands are also exempt from replacement requirements. The AWP is not intended to be a tool to enact large-scale regional conservation, but can contribute to the minimisation of impacts and replacement of many associated functions. Large-scale retention efforts may be better suited to other strategies described below.

Bearing this in mind, the AWP is most effective in areas where development pressures can be mitigated through avoided and minimised impacts to wetland functioning which reduce GHG emissions from wetland development, and to climate adaptation through replacement of functional losses such as flood and drought alleviation, and local climate cooling and humidifying. Minimisation of impacts to boreal wetlands through the implementation of best practices and knowledge-transfer aligns well with the aims of the AWP, and will be particularly important as development pressures increase in the boreal region and boreal transition zone.

Where losses cannot be avoided, it will be important to maintain the 3:1 mid-point replacement requirement objective of the policy in order to replace functions essential to climate adaptation. This also aligns with federal and provincial government aims described in the GIF, PCF and CLP. Moreover, where restored wetlands are retained in perpetuity, they provide a carbon management tool for future generations, enhancing long-term sustainability, and replacing historically lost ecosystem services.

Education of developers on the legality of development activities, advantages of wetland retention, and best practices to achieve avoidance and minimise impacts will be key to achieving the aims of the AWP and align with existing knowledge-exchange and advisory programs in the White and Green Zones.

It is understood that the GOA is currently funding a 2-year plan to develop a provincial wetland monitoring program to monitor the aims and outcomes of the AWP and LUF (Cobbaert 2017). Such a program should vastly improve our understanding of the state of Alberta's wetlands, the achievements of the policies and regulations affecting them, and indicate where resources are best targeted.

Carbon Offsets

A carbon offset protocol for wetland restoration was drafted for the Alberta Carbon Offset System in 2010 but did not move forward due to lack of scientific evidence and concerns over additionality with respect to the AWP. It is unlikely that constructed or restored wetlands could generate carbon offsets due to switchover times, and potential additionality issues (when wetlands are replaced due to AWP replacement requirements). However, the Alberta Climate Change Office (ACCO) may provide a route to incentivise the carbon management capabilities provided by retention of wetlands, and retention and restoration of grasslands, since retention is not considered as part of the Wetlands Offset activities.

The AWP raises questions regarding the regulatory additionality of wetland retention as a carbon management tool in Alberta, due to the primary aim of the AWP to retain wetlands via avoided conversion. The primary concern is conservation offset stacking with the Wetland Offset Program (WOP) (Government of Alberta 2015). The WOP defines conservation offsets, and meets the replacement requirements of the AWP, through:

- the restoration of a previously drained wetland,
- enhancement of a degraded wetland, or
- construction of a new wetland.

Wetland retention is not considered in the WOP. It could therefore be argued that the retention of a wetland, and generation of offset credits for carbon management services, does not constitute offset stacking.

Similar additionality concerns may transpire over the avoided conversion of grasslands, primarily due to the aims set out in the LUF. However, the LUF does not specifically address grassland retention on private land, only in designated conservation areas. Several carbon offset protocols for the avoided conversion of grasslands have already been developed in voluntary and compliance markets (see *Table 1* in *10.3 Existing Grassland Carbon Offset Protocols*), and a grassland protocol (likely for avoided conversion) is currently being developed for the Ontario/Quebec offset market. These protocols could be adapted for avoided conversion of grasslands and wetlands in the ACOS.

Further, ongoing ecosystem losses hold potential for making the case that ecosystem retention is not a business-as-usual/common practice. There may be an opportunity for ACCO to consider assessing if additionality could be established for wetland retention activities. However the decision will ultimately lie with the interpretation of additionality and offset stacking by the ACCO (see *Box 1 – Additionality*).

While it is recommended that separate offset protocols are developed to incentivise avoided conversion of wetlands and grasslands in Alberta, a compelling case can also be made for including GHG emissions incurred via ecosystem conversion in existing land management offset protocols, such as the "Nitrous Oxide Emission Reduction Protocol" and "Conservation Cropping Protocol". This would mean that project owners could only generate carbon offsets when they can prove that land management offsets are not negated by conversion of wetlands and grasslands on the same land parcel. It is unlikely that significantly higher verification costs would be incurred in this system since the current baseline and project evidence pieces could be employed (i.e. photographs and satellite imagery). However, effectiveness on a provincial scale would rely on extensive participation.

Box 1 - Additionality

Additionality is a fundamental requirement of any carbon offset credit. It necessitates that a project or activity exists primarily as a result of the carbon offset system, i.e. it is 'additional' to business-as-usual.

There are five common tests to determine if a project meets additionality criteria:

1. Adoption level –the project activity is not well-established as a business-as-usual activity.
2. Regulatory additionality – the project activity is not required by law.
3. Financial additionality – the project activity is only economically viable with the sale of offset credits.
4. Technical additionality – technical risks in the project activity mean that the sale of offset credits is required to reduce investor risk to a reasonable level.
5. Socio-cultural additionality – the project activity is not accepted or unknown.

The ACOS definition for regulatory additionality is, "*Required by law applies to any federal, provincial or municipal regulation that directly affects or requires the activity, and may be for purposes other than controlling greenhouse gas emissions*" (Government of Alberta 2011).

Issues potentially exist with additionality in projects that generate offsets for avoided conversion. In Alberta, there are also concerns regarding regulatory additionality for wetland protocols with the AWP.

6.1.2 Government Program/Partnership Opportunities

In the 2016 and 2017 Federal Budget announcements, the Government of Canada (GOC) outlines a strong commitment to building a "Clean Growth Economy" through investments in infrastructure and projects that reduce GHG emissions, mitigate the impacts of climate change, and provide clean and safe water resources (Government of Canada 2016) (Government of Canada 2017). The key federal funds that align strongly with wetland and grassland retention and restoration projects include (see *10.1 Federal Funding Streams* in Appendix):

- **Bilateral Agreements -** $$9.2 billion will be made available on a cost-sharing basis to provinces and territories over the next 11 years (starting 2018-2019) for projects that support GHG mitigation efforts as outlined in the PCF, support the health of the environment such as water and wastewater infrastructure, aid adaptation to climate change, and build cultural and recreational infrastructure. Partnerships could engage the GOA on the clear alignment that wetland and grassland retention and restoration activities have with the aims of Bilateral Agreements and green infrastructure.
- **Green Infrastructure Fund (GIF)** - $5 billion will be allocated on a cost-sharing basis over 5 years (starting 2018-2019) through the **Canada Infrastructure Bank** (including $2 billion through Infrastructure Canada's 'Clean Water and Wastewater Fund' (CWWF)) towards green infrastructure projects. Funds will be made available to: initiatives that support the implementation of the PCF and reduce GHG emissions; invest in clean and safe water and wastewater; the construction of naturalised systems for management and treatment of wastewater and storm water, and; will aid adaptation to a changing climate. CWWF projects will be identified by provinces and territories, in collaboration with municipalities. Partnerships could look to access funds to retain and develop green infrastructure priorities with the GOA.
- **Disaster Mitigation and Adaptation Fund (DMAF)** – Cost-sharing fund which is **national** in scope, and will receive $2 billion to support targeted national, provincial and municipal infrastructure required to deal with the effects of a changing climate. Projects that provide infrastructure to alleviate the impacts of flooding are likely to be a key target area, in addition to projects that aid prevention and mitigation of wildfire events. Wetland and grassland retention and restoration activities could utilise the DMAF as climate mitigation and adaptation tools.
- **Low Carbon Economy Fund (LCEF)** - $2 billion over 5 years to support provincial and territorial actions towards the aims of the PCF, in particular projects that: reduce GHG emissions; develop climate change adaptation and resiliency; achieve action on short-lived climate pollutants; yield the greatest absolute GHG emission reductions for the lowest cost; are incremental to current plans, and; achieve significant GHG emission reductions towards Canada's national 2030 target. Further details on fund allocation are expected soon.

The GOC has expressed interest in allocating funds to 'shovel-ready' projects and programs that involve partnerships with provincial governments, particularly regarding green infrastructure projects through the GIF and bi-lateral agreements. Each of these funding streams involve collaboration with provincial or

municipal governments through cost-sharing and project identification/fund allocation. Details regarding which projects constitute 'green infrastructure' are not readily available at this time (although some details are available regarding CWWF projects), but discussions with the GOC suggest that wetlands and grasslands are considered important green infrastructure components.

As a result, wetland groups have been strongly encouraged by the GOC to partner with the GOA to develop green infrastructure projects in the form of wetland and grassland retention and restoration; the GOC is convinced of the value of these activities, focus should now shift to convincing provincial government. Interested parties can utilise the information provided in the 'Business Case Report' and 'Science Summary' documents, in tandem with this report, to expose the significant benefits and alignment of retention and restoration of wetlands and grasslands with green infrastructure priorities, with a view to securing GIF and bilateral agreement resources in partnership with the GOA. The strong and successful historical and ongoing partnerships between NGOs and the GOA, and experience in wetland and grassland project and program implementation, should allow a strong case to be made for the allocation of national funds to shovel-ready wetland and grassland retention and restoration projects in the province.

6.1.3 Shovel-ready projects

To make a strong case for fund allocation, public/private sector partnerships will have to demonstrate 'shovel-ready' projects, and the targets they expect to achieve. Projects and programs could take a number of forms, but payment for success (PFS; also known as payment for performance) are key elements in the approach.

Incentive-based programs could build on the successes of the WRRP and AWEP. These programs have seen significant uptake by various stakeholders to achieve provincial priorities through wetland restoration activities. Stakeholder engagement in restoration activities can be particularly effective; it assigns ownership to the project meaning that multiple benefits are achieved for numerous parties, and means that proper management and retention are more likely in the long-term.

The WRRP and AWEP are not wholly suited to achieving carbon management through retention and restoration activities due to their short-term funding. However, they provide an excellent model from which to develop similar programs aimed at retaining and developing carbon management capacity, and climate change mitigation and adaptation, through wetland and grassland retention and restoration activities. Combined with the long-term conservation and stewardship tools enabled by the ALSA (see *3. Drivers/Opportunity* section), incentive-based programs could ensure restored and retained wetlands and grasslands are protected in perpetuity and contribute to LUF and Regional Plan aims.

The 'Conservation Easement' and 'Revolving Land Conservation' programs currently being implemented by DUC are an example of how such a program can work; there are many other similar programs being implemented by other conservation-minded NGOs that also utilise these tools. These programs provide a

strong basis from which to expand retention and restoration activities, and protect wetlands and grasslands as carbon management tools in perpetuity. Funds from bilateral agreements and/or the GIF could be used to compensate land owners for improved land management and restricted land use practices, while achieving carbon management, climate change mitigation and adaptation, and other ecosystem services in line with green infrastructure priorities. Such a program could be overseen by the GOA, and implemented through partnership with experienced organisations.

Finally, efforts in the boreal region will be important with increasing development pressure. It is clear that some boreal wetlands will be developed to access natural resources. Research into, education on, and implementation of, sustainable land use and beneficial practices will be essential to maintaining ecosystem function and preventing loss of carbon stores. Federal and provincial investments could be matched by developers and the private sector to implement sustainable land use techniques, maintain hydrological connectivity, and minimise functional impacts to boreal ecosystems. Existing programs and partnerships are well-placed to impart knowledge and experience to both governments and various industries managing resources in the boreal region through:

- knowledge and exchange opportunities,
- development and integration of conservation products (planning/monitoring/reporting information support),
- helping to advance best management practice program components (e.g. development of an information and exchange management system),
- helping address research priorities and information gaps,
- assistance with evidence-based decision-making, and;
- implementation of programs to achieve sustainable land use in the boreal region, in alignment with carbon management, green infrastructure, and climate adaptation priorities.

6.2 Private/Industry/Corporate Sector Engagement

Increasing private sector interest in carbon management and sustainability means that opportunities are developing through private investment initiatives and frameworks. Industry and corporations see value in investments in carbon offsets and low carbon management production, to improve public trust, enhance marketability of the company and products, and gain supply-chain efficiencies. Frameworks to report company, city, state and regional emissions and sustainability (such as the Carbon Disclosure Project) have been developed and are growing, leading to a competitive market in which corporations compete to improve sustainability ratings and therefore marketability (Carbon Trust and BSR 2016) (CDP 2017).

Private sector/NGO partnerships could look to collaborate and invest finance and services in wetland and grassland retention and restoration, as a pathway towards improving organisational sustainability, marketability, and public trust, and ultimately satisfy shareholders. Funds and services could be used in

collaboration with federal and provincial funding streams to implement projects and programs to achieve federal and provincial government priorities.

6.2.1 Voluntary Carbon Quantification Methodology

The development of a tool to quantify the carbon management benefits of wetland retention, and grassland retention and restoration, would open a variety of pathways for private investment. While past attempts to incorporate such tools into the Alberta Carbon Offset System have been unsuccessful, similar protocols have been developed in other systems that could be applied in Alberta through voluntarily offset markets, and therefore utilised in private investment initiatives.

Wetlands

Retained FWMSWs and boreal wetlands provide significant carbon management benefits, and could attract private sector investment in carbon offset projects. However, a significant barrier exists since there is no approved carbon offset protocol in any system for the avoided conversion of FWMSWs or boreal peatlands. For the private sector to make a viable investment in wetland retention for the carbon management benefits, an approved protocol for avoided wetland conversion will need to be developed, or included in existing land management carbon offset protocols.

A number of protocols have been approved for the avoided conversion of grasslands to cropland (see below), and are now being developed for the Ontario and Quebec carbon offset system. Since, per hectare, retained wetlands have greater net sequestration rates than grasslands, and wetland losses contribute greater GHG emissions than grassland conversion, it stands to reason that a quantification methodology for avoided conversion of wetlands would be significant. A methodology could be adapted from avoided conversion of grasslands protocols.

Partnerships could look to develop **carbon quantification methodologies for avoided conversion/retention of wetlands in voluntary markets**, applicable to boreal peatlands and FWMSWs in Canada. Contentions may exist over the viability of offsets due to additionality as described above (see *Box 1 – Additionality* and *Carbon Offsets* section). Whether a project is considered additional or not would be determined by the voluntary program/registry and their interpretation of additionality. The VCS may provide a promising framework within which a voluntary offset protocol could be built for the avoided conversion of wetlands in Alberta, despite concerns regarding conservation offset stacking and legal additionality (see *10.2 The Verified Carbon Standard Additionality Criteria* in Appendix).

The receipt of incentives may also cause issues when partly financed by government funds with a key aim of reducing GHG emissions, as described in the aims of the GIF. Again, interpretation of this issue would lie with the voluntary program/registry. However, the case could be made that, without private-sector investments, retention projects would not be implemented since public funds cannot be leveraged without cost-sharing. Further, the proportion of public funds typically provided to a green infrastructure

project is small, when taking full cost accounting measures into effect, with not only capital investments, but ongoing operational and maintenance costs over the life of the project. Private-sector investors could also expect a return on investments via the sale of offset credits, making the sale of offsets financially additional. Alternatively, if additionality concerns persist, offsets could be generated proportional to private investment, excluding additionality concerns regarding public financing. Perhaps the simplest way to implement proportional offset generation could be to separate private and public funds within project developer budgets.

Since the carbon benefits from an offset protocol for wetland restoration may not be realized for a long time, projects and programs pursuing wetland restoration activities should focus on climate change adaptation benefits and long-term carbon management implications, as well as other ecosystem services.

Grasslands

Grassland restoration and retention activities have positive, measurable benefits to carbon management. As a result, tools for the quantification of carbon sequestration achieved by retention, restoration and improved management already exist (see *Table 1* in *10.3 Existing Grassland Carbon Offset Protocols* in Appendix). Many of the existing tools deem projects in Alberta as eligible. This means that they could be utilised by the private sector for voluntary and potentially compliance projects under the frameworks below. Additionally, the Ontario and Quebec offset system is developing a grassland offset protocol; details are yet to be confirmed but it is thought that the protocol will include avoided conversion of grasslands.

The ability of the private sector to use the protocols mentioned in Table 1 (Appendix) to generate offsets will depend on the system's interpretation of additionality, and the private sector's acceptance of the protocol and offset system. Additionality concerns regarding grassland conversion will likely be restricted to those concerning common practice and development pressure; there are few federal or provincial legal or programming measures to ensure sustainable grassland management or retention outside protected areas.

Existing protocols involving grassland retention, restoration and management, and future wetland retention protocol(s), could be utilised to gain private sector funding, either through offsetting, insetting and/or PFS frameworks (see *6.3 Implementation Mechanisms - Pay for Success Contracts* below). There is also significant potential to leverage private-sector funding to match federal and provincial funding sources in a combined project, provided additionality criteria are met (see *6.1.2 Government Program/Partnership Opportunities*6.1.2).

6.2.2 Carbon Financing

Carbon financing refers to the use of private investments in projects that generate carbon offsets. Investors often require an approved or verified offset quantification protocol to invest. As outlined in

Table 1 (Appendix), a number of viable protocols already exist for grassland retention, restoration and management projects; protocols will need to be developed for avoided conversion of wetlands. A number of pathways to private-sector financing exist or are being developed.

NatureVest, the investing arm of the Nature Conservancy, is a conservation finance platform that creates financing deals in conservation projects that deliver financial returns to investors, and guaranteed compensation to landowners. There is increasing interest in projects based in Canada. In particular NatureVest are interested in generating carbon offset credits for the avoided conversion, restoration and management of Canadian grasslands. Credits would be sold at a premium to large corporations that are obligated to offset their GHG emissions under carbon disclosure projects.

Climate Trust Capital, the investing arm of The Climate Trust, has recently announced its first carbon investment in grassland conservation/avoided conversion in the US, under a similar framework (Krifka 2017). The project takes a collaborative approach involving both public and private sector conservation management support (from TNC and the Natural Resource Conservation Service). An 11-year $260,000 investment commitment from Climate Trust Capital has been used to place a conservation easement which prevents grassland conversion to cropland or development, with some funds reserved to cover project development and carbon offset verification costs.

There may be scope for collaboration with private investment fund organisations such as NatureVest, Climate Trust Capital, and/or with The Nature Conservancy, to implement grassland and wetland projects that generate offset credits in Canada. Such an approach could be particularly attractive due to the significant gains in carbon management and financial efficiency that can be made through integrated management on a landscape scale. To generate investible carbon offset credits for wetland retention, investors will require an avoided conversion of wetlands protocol approved by a voluntary or compliance offset standard (see *6.2.1 Voluntary Carbon Quantification*).

In 2010 the International Civil Aviation Authority (ICAO) agreed to an ambitious target of attaining carbon neutral growth by 2020. An integral part of the strategy towards carbon neutrality is through offsetting emissions via market-based measures, referred to as, “Carbon Offsetting and Reduction Scheme for International Aviation” (CORSIA). Voluntary pilot and first stages of the scheme, which are set to run from 2021-2026, have gained confirmed participation from 68 states (87.5%), including Canada in September 2016 (ICAO 2017). The CORSIA will become compulsory in 2027 except for some exempted states.

As a result of CORSIA participation, Canadian airline companies are now searching for ways to offset emissions from international flights. Details regarding frameworks and rules for offset verification are under development, and are expected to be finalised in 2018 (ICAO 2017). It is therefore unclear at this stage which offsets and standards the ICAO will allow within their system.

Canadian (or international) airline operators could be engaged to assess collaboration on a program of offsets generated by retained wetlands, and restored and retained grasslands. It is likely that Canadian airline operators would look favourably on Canada-based offset projects, particularly those that provide additional benefits to local businesses, tourism, and environment that can enhance public trust and corporate social responsibility (CSR). There could be a significant opportunity to employ approximately 39 million tCO_2e/year carbon sequestration capacity of Alberta's wetlands and grasslands to offset emissions from international flights through wetland and grassland projects funded by the ICAO and Canadian airlines via CORSIA.

6.2.3 Green Bonds

Green bonds are a relatively new form of environmental financing that is seeing substantial recent growth, particularly in Canada; the climate-aligned bond market was valued at $32.9 billion in 2016, fifth in the world (Climate Bonds Initiative 2016). Green bonds work in the same way as a conventional financial bond; they are a type of 'debt investment' where the bond issuer sells a bond in exchange for capital finance, and is expected to repay the buyer interest at a set (coupon) rate, plus the value of the bond upon maturity.

The key features of green bonds are that they're earmarked for projects that have positive environmental and/or climate benefits (termed Green "Use of Proceeds" Bonds), and they're tax-exempt (Climate Bonds Initiative 2017). These features make green bonds particularly attractive for investors who can capitalise on CSR and public trust benefits to their organisation, while making tax-exempt investments. Scope of 'green' projects may also be extended to include projects with social objectives (International Capital Market Association 2016).

The green bond market is in its infancy. The definition of a 'green' project is largely left to the issuer, although "Green Bond Principles" (GBPs) have been developed which describe several indicative broad categories of green projects, many of which align with wetland and grassland retention and restoration activities (International Capital Market Association 2016) (see *10.4 Green Bond Principles* in Appendix).

Capital financing from the sale of green bonds could be directed towards wetland and grassland retention and restoration projects in a number of ways. First conservation organisations may look to issue green bonds directly to raise internal capital funding to match GIF and bilateral agreement funds. High demand for green bonds from a range of investors mean that sales might be relatively accessible. However, direct sales of green bonds could leave organisations open to interest and maturity payments to investors and associated financial risk. Risk could be reduced through utilisation of a PFS framework (see *6.3 Implementation Mechanisms - Pay for Success Contract*), however, such investments may be more suited to public or private investment funds.

Alternatively, green bonds could be sold by an investment firm, such as NatureVest, or through interested corporations as part of an insetting project (see *6.2.4 Insetting in Supply Chains*). Again, such funds could be used to match funding from provincial and federal government sources. Utilising green bonds to finance an insetting project could be a particularly astute activity; the corporation could utilise tax-exempt capital funds to finance wetland/ grassland retention and restoration projects (through conservation organisation partners), while achieving the benefits of an insetting project (see *6.2.4 Insetting in Supply Chains*). Further assessment by a qualified financial professional will be required to assess the benefits and risks of green bonds to individual organisations.

6.2.4 Insetting in Supply Chains

Insetting refers to carbon emission offsets or reductions achieved by an organisation through investments in its supply chain or 'sphere of influence' (hereon referred to as 'insets'). Insets are not typically included in formal carbon market trading systems, but instead are utilised by organisations to improve CSR and public trust, and towards achieving carbon neutrality. Insetting is a reasonably new concept that has recently grown in interest and application, despite first being coined in 2009 (Tipper, Coad and Burnett 2009).

Establishment of insetting standards is under development. However emissions offsets achieved through an insetting project must be verifiable, measurable and legitimate. For this reason, insetting projects follow offsetting principles of additionality, leakage, uniqueness, measurability and verifiability (Davies 2016).

Insetting has a number of advantages over offsetting for the implementing organisation:

- costs associated with developing a verified carbon offset protocol are reduced;
- transactional costs associated with the verification and sale of offset credits are reduced;
- practices/protocols can be developed according to the organisation's operations (rather than following pre-defined protocols), and;
- projects are fully integrated into the supply-chain which assigns responsibility for emission reductions to the organisation itself (a key criticism of offsetting).

While also benefitting from improved public image and meeting shareholder expectations, organisations that implement insetting projects can achieve efficiency gains, and improve sustainability, traceability and transparency of their products and within their supply chains.

There is scope to develop an insetting project for the retention and restoration of grasslands and wetlands in Alberta, funded and owned by an interested corporation (see *6.3 Implementation Mechanisms - Pay for Success Contracts* section) and implemented by a knowledgeable partner with strong ties to

landowners and developers. There are several factors that make Alberta particularly suited insetting projects:

- The province hosts a strong knowledge-base regarding carbon management frameworks and projects with numerous project developers, verifiers and aggregators of GHG reduction projects. Conservation organisations working in the province can capitalise on this expertise, and the growing interest in insetting and CSR of organisations operating in Alberta.
- Agriculture, food processing, energy and forestry are leading industries in Alberta which have an opportunity to enhance their public image using their influence to implement wetland and grassland retention and restoration projects within their supply chains.
- Projects would likely be implemented within comparable geographic locations meaning that measurement of offsets and reductions could be simplified and aggregated to reduce costs.
- Evidence for retention could be relatively simple in the form of dated and geo-referenced photographs, with random spot checks for verification. The participation of some supply-chain parties in the ACOS means that there is existing knowledge regarding evidence requirements and verification for emission reduction projects.

Issues may persist with regards to additionality of retention and restoration projects with the development of conservation offsets, and with the AWP requirements regarding wetland retention and replacement (see *6.1.1 Policy Alignment Opportunities*). While details regarding conservation offsets are yet to be announced, the same case could be made for the additionality of an insetting wetland retention project, as described for the development of an offset protocol above; the Alberta Wetland Offset Program does not consider retention as a conservation offset.

Insetting may include a greater risk of 'double-counting' of emission reductions/sequestration (counting the same emission reduction twice, typically in two carbon offset systems). Current protocols in the ACOS only consider cropped areas in generating carbon offsets (Government of Alberta 2012) (Government of Alberta 2015), which should eliminate double counting for wetland retention and land management activities in the ACOS.

Conservation organisations could look to collaborate with industry partners in sectors that are involved in land and resource management and who are willing to invest in their supply-chain to develop and implement insetting projects regarding wetland and grassland retention and restoration.

6.3 Implementation Mechanisms - Pay for Success Contracts

Pay for success (PFS) contract mechanisms have traditionally been employed by governments to achieve social outcomes (termed Social Impact Bonds) (Social Finance Limited 2014). However, the PFS contract mechanisms are increasingly being used as effective methods for achieving large-scale regional conservation in many locations across a landscape, where significant investment is expected over several years (Sokulsky and Alexandrovich 2016).

Simply put, PFS mechanisms provide a financial reward for verified (conservation) outcomes of priority to an investor, through the sale of (conservation) offsets. PFS therefore differs from the traditional grant funding approach where payments are made for actions rather than outcomes. PFS mechanisms are particularly attractive to governments as investment frameworks since they reduce risk to investors by linking payments to achievement of outcomes, rather than upfront grant payments or reimbursement of expenses. Financial risk is shared with the *producer* of the desired outcome (i.e. conservation professionals and land owners), who is in the best position to manage risk. This in turn improves public trust and support for conservation PFS programs.

Innovation and efficiency are encouraged as the producer has a financial incentive to achieve conservation outcomes cost-effectively. Long-term contracts can be achieved through long-term management plans; landowner agreements; dispositions (on Crown Land) or easements that exclude incompatible land management; financial assurances; and endowment accounts, which encourage the continuation of conservation outcomes.

In Alberta, the conservation and stewardship tools enabled by the ALSA could be utilised to ensure the longevity of a PFS program; this will be important to ensuring conservation outcomes are legitimate. However, use of these tools could also to give rise to issues with additionality. For example, if a conservation easement is placed on a parcel of land for the retention of an ecosystem, conservation offsets may not meet regulatory additionality criteria. Interpretation of additionality in this case will depend on the language used in financial agreements and contracts, and the program developer.

Ongoing monitoring requirements promote dialogue, adaptive management and learning for both producers and buyers of conservation outcomes. Cost-effective production of conservation outcomes is encouraged with the potential for a return on investment, and revenue generation for the producer. There could be an opportunity to include monitoring and verification of conservation outcomes from wetland retention and restoration projects with the GOA wetland monitoring program under development (Cobbaert 2017).

Efficiencies are also gained in administration. Conservation professionals are best-placed to identify priority areas, aggregate projects, and design and implement projects, including negotiation of prices and agreements with landowners. Buyers of conservation offsets can efficiently screen projects to purchase priority offsets at a competitive price, while project implementation and associated financial risks remain with the producer of conservation outcomes. Conservation organisations in Alberta have a wealth of experience implementing conservation projects, and are well-placed to take on the role of conservation professionals in an Alberta-based PFS project.

There are four key PFS mechanisms that can be implemented to achieve conservation outcomes (see *10.5 Pay For Success Mechanisms* in Appendix) (Sokulsky and Alexandrovich 2016):

1. Partial Pay for Success
2. Public-Private Partnership with Project Seed Funding (PPP)
3. Full Delivery
4. Entrepreneurial Banking

In terms of wetland and grassland retention and restoration in Alberta, PFS contracts provide a mechanism that can utilise government funding (including the GIF, and funds from the Climate Change and Emissions Management Fund), private-sector investments in insetting and green bonds, the knowledge and expertise of conservation professionals, and engagement of land owners or managers. Of the above strategies, "Public-Private Partnerships with Project Seed Funding" (PPP), and, "Full Delivery" mechanisms are likely to be most successful in implementing a wetland and grassland retention and restoration program within Alberta (see below). Conservation outcomes could be measured in terms of carbon storage (or avoided methane emissions), carbon sequestration, or other ecosystem services (carbon management outcomes would be unfeasible for wetland restoration projects). They could also include verified carbon offsets or conservation offsets, depending on the program.

California provides an example of where the PFS framework could be utilised in conjunction with public funds, and public- and private-sector purchase of conservation offsets, to reduce methane emissions from the dairy industry (See *10.6 California Dairy Industry – An example of how a PFS mechanism could utilise public funds to set minimum conservation offset prices* in Appendix).

6.3.1 Public-Private Partnerships with Project Seed Funding

The Public-Private Partnership (PPP) mechanism is best suited to markets where demand for conservation offsets is uncertain but is expected to grow, and where outcome producers are unlikely to have access to private capital to fully fund the project. The mechanism utilises public funds as partial capital to implement a project. Capital funds can be less than the project cost since producers stand to profit from the sale of conservation offsets. Funds are then recouped once conservation outcomes are verified, and sold to private-sector buyers who require conservation offsets to meet regulatory, shareholder, social, or consumer expectations (see *10.5.1 Public Private Partnership with Project Seed Funding Mechanism* in Appendix for details). If conservation offset buyers cannot be found, public funds will not be repaid but will have been invested in conservation outcomes.

6.3.2 Full Delivery

The full delivery mechanism utilises contracts between conservation outcome producers and potential conservation offset buyers, prior to the implementation of a project (see *10.5.2 Full Delivery Mechanism* in Appendix). Once the future purchase of verified conservation offsets is contracted, the producer can

raise private-sector capital investments for project implementation; payment-in-lieu, insetting investments, and/or the sale of green bonds could be implemented to raise private capital (see *6.2.4 Insetting in Supply Chains* and *6.2.3 Green Bonds* sections). Once conservation outcomes are verified, conservation offsets are sold as per the terms of the contract, and repayment to capital investor(s) is made. Additional offsets may be generated for sale to other buyers.

6.3.3 Implementation Examples – Public-Private Partnerships and Full Delivery

Public-Private Partnerships with Project Seed Funding	
Key Players	**Capital Funder(s)**: Public-sector – GOA and GOC. May also include private-sector and investment firms. **Implementer(s)/Producer(s)**: Conservation professionals (e.g. DUC), public sector (e.g. GOA), landowners, industry (forestry, energy) **Verifier**: Conservation professionals, independent consultants, or public-sector (e.g. GOA) **Conservation Offset Buyer(s)**: Corporations, investment firms, public sector (e.g. GOA)
Capital Funding	• Federal and provincial government funding streams that align with wetland and grassland retention and restoration activities could be leveraged to provide partial capital funding, for example the GIF and Bilateral Agreement funding streams. • There is also scope to include some proportion of investor capital to further reduce the use of public funds and risk to the GOA. • Project developers (e.g. conservation professionals) and conservation investment firms (e.g. NatureVest) may also generate private capital through the sale of green bonds.
Implementation	• Funds could be made available directly to landowners as part of a GOA-administered incentive-based program. However, the use of a designated third-party conservation professional to implement projects and disseminate funds would provide multiple benefits, including effective screening for successful projects, use of technical expertise, stakeholder engagement and landowner liaison, and better use of resources. • In addition, conservation or carbon offsets could be generated and verified under a compliance-based market. • Verification of conservation outcomes could be incorporated into the planning for the Alberta wetland monitoring program to achieve efficiencies, and ensure outcomes align with provincial priorities in the AWP and LUF. • To ensure longevity of the program, the conservation and stewardship tools enabled under the ALSA, could be employed within financial agreements. For example, a conservation easement could be included in the financial agreement for capital funding to ensure wetlands or grasslands retained or restored as a result of the project exist in perpetuity. • On Crown land, public funds (such as GIF) could be matched by disposition owners (such as a forestry company) to implement projects and BMPs as identified by conservation professionals. Ownership of offsets and repayments to public-sector investments would depend on the definition of offset ownership in relevant policies, protocols and contracts. Carbon offset forestry projects undertaken on Crown Land in British Columbia include a contractual agreement (Atmospheric Benefit Sharing Agreement) to ensure that offsets generated by the project are transferred from the Crown to the project developer for future sale (Offsetters 2013).

	• For example, an energy company with a pipeline agreement disposition could utilise public funds as part of a PFS program to implement BMPs as identified by conservation professionals to maintain wetland functionality, carbon storage and sequestration, and to monitor results to feed into knowledge exchange programs. A contract between the energy company and the Crown would entitle the energy company to any offsets generated from the project.
Sale of Offsets	• Offsets could be sold to the private-sector directly by landowners, or via an aggregator such as a conservation professional, a conservation investment fund, or the GOA. • External organisations and/or the GOA could guarantee landowners a minimum sale price for offsets/conservation outcomes, improving landowner confidence in project implementation. In the case of Crown land, the landowner would be the Crown with an external organisation (such as a private investment firm) acting as the offset buyer. • Depending on the terms set out in the financial agreement, a proportion of the revenue generated from offset sales will repay public-sector capital investments.
Benefits/Risks	• Investment risks are split between the public-sector investor and the producer. The amount of risk attributed to each party is related to the proportion of capital costs that are paid by the conservation buyer. • The public-sector investor will need to effectively screen projects to ensure public funds are being spent on those projects most likely to achieve priority outcomes. A third-party conservation professional may be best-placed to perform project screening. • Since the demand for conservation offsets in Alberta is relatively unknown, it is likely that initially capital investments will cover a large proportion of capital expenses, and therefore the risk to the GOA will be higher. However, as the market for conservation offsets improves, and as producers learn to implement projects more efficiently (through adaptive management) and negotiate offset sales, producers may accept more risk and reduced capital investment.

Full Delivery

Key Players	**Capital Funder(s)**: Private-sector – Investment firms, banks, corporations, private investors **Implementer(s)/Producer(s)**: Conservation professionals (e.g. DUC), public sector (e.g. GOA), landowners **Verifier**: Conservation professionals, independent consultants, or public-sector (e.g. GOA) **Conservation Offset Buyer(s)**: Corporations, investment firms, public sector (e.g. GOA)
Capital Funding	Private-sector capital finance could be leveraged via a number of mechanisms: • An insetting project could be implemented within the Full Delivery mechanism. For example, an agri-food corporation might look to invest in a wetland retention and restoration program with its agricultural producers to achieve GHG emission offsets, climate adaptation and resiliency, and water quality improvements within its supply-chain (see *6.2.4 Insetting in Supply Chains* section). Investors in an insetting project would receive conservation offsets as a return on capital investment.

	• Conservation professionals could raise private capital for a targeted wetland retention and restoration program through the sale of green bonds to private investors (*see 6.2.3 Green Bonds* section). Investors could be financial institutions (e.g. banks), investment firms (e.g. NatureVest), corporations or private entities. Green bond contracts might include terms detailing coupon repayments to investors only once conservation offsets are verified and sold. Investor and producer confidence is improved by contracts for offset sale (see Sale of Offsets below).
Implementation	• Conservation professionals could implement and oversee the program, and are best placed screen projects for those most likely to generate verifiable conservation offsets. Conservation professionals could also aggregate conservation offsets for easier sale to interested buyers, and to reduce administration costs to individual producers. • The GOA could act as a verifier of conservation offsets; the development of the Alberta wetland monitoring program could incorporate verification of wetland conservation offsets to achieve efficiencies. • To ensure longevity of conservation outcomes, conservation and stewardship tools enabled under the ALSA could be written into contracts for capital financing, either as part of an insetting project, or in green bond contracts. • In the case of projects undertaken on Crown land, private investors could finance projects through the disposition owner (e.g. energy or forestry company), most likely in collaboration with a conservation professional. Ownership of offsets and repayments to investors would depend on the definition of offset ownership in relevant policies, protocols and contracts. Carbon offset forestry projects undertaken on Crown Land in British Columbia include a contractual agreement (Atmospheric Benefit Sharing Agreement) to ensure that offsets generated by the project are transferred from the Crown to the project developer for future sale (Offsetters 2013). • For example, an energy company with a pipeline agreement disposition could gain investment from an investment organisation such as Climate Trust Capital as part of a PFS program to implement BMPs as identified by conservation professionals to maintain wetland functionality, carbon storage and sequestration, and to monitor results to feed into knowledge exchange programs. A contract between the energy company and the Crown would entitle the energy company to offsets generated from the project, who in turn would sell offsets to the investor as initially contracted.
Sale of Offsets	• Conservation professionals could liaise with interested corporations and agree contracts for the sale of conservation offsets once they are verified, including a set sale price and possibly a set number of offsets. • Interested corporations could be those providing capital investment (in which case conservation offsets would repay capital investments, this is a form of insetting) or other corporations wanting to purchase conservation offsets to meet regulatory, shareholder, social, or consumer expectations. Investment firms such as NatureVest may also be interested in purchasing offsets from producers at a set price to sell on to larger corporations. • Alternatively, the GOA might be interested in purchasing offsets at a set minimum price to improve producer and investor confidence, and guarantee that public funds are spent on verified conservation outcomes (see *10.6 California Dairy Industry – An example of how a PFS mechanism could utilise public funds to set minimum conservation offset prices* in Appendix). • Any offsets generated additional to contractual obligations are open for sale to other buyers for profit.

Benefits/Risks	• The public-sector assumes very little risk in the Full Delivery mechanism. • The conservation buyer risk is reduced as producers compete for private-sector capital financing with high-potential projects. • Risk is also reduced for the producer since the sale of conservation offsets is contracted pending successful verification of outcomes; the producer is best-placed to manage project success. • There must be high confidence in the successful verification of conservation outcomes in order to use conservation offset sales as a basis for securing capital financing from the private-sector. • Demand for conservation offsets must be high and predictable to ensure the Full Delivery mechanism is successful. Private-sector demand could be supplemented by the public-sector via minimum price-setting. Producers must also have access to private capital funding to implement projects.

7. Considerations for Implementation

The implementation of any of the regulatory-based approaches or incentive-based programs detailed throughout this report should follow a number of guiding principles to ensure effective implementation and consensus from all parties.

Stakeholder engagement is the cornerstone of any successful project, program, policy or regulation. Stakeholders that might be affected or involved in wetland and grassland retention and restoration activities include the GOA and GOC, Indigenous groups/communities, municipalities, the private sector and industry leads/organisations, NGOs, and community groups such as Watershed Planning and Advisory Councils (WPACs). Policies and programs should incorporate each stakeholder's viewpoint and aim to achieve consensus, while maintaining the purpose of the program or policy.

As demonstrated by the WRRP, AWEP, WPAC restoration projects, and countless other programs, collaborative working with land owners and managers achieves multiple benefits. Local knowledge can be gleaned to effectively implement projects while involved land owners, managers and communities gain ownership of the project which aids its retention. This is a notable benefit to wetland and grassland projects for carbon management purposes since their existence in perpetuity is critical to maximising carbon management services. A number of community groups and organisations are already in existence, such as the WPACs and NGO organisations, that can be utilised to gain stakeholder opinion and investment.

Education of stakeholders on the value of wetlands and grasslands, not only as carbon management tools, but more immediate and visible ecosystem services such as flood and drought alleviation, biodiversity and wildlife provisioning, and recreational opportunities, is also key to successful implementation. When stakeholders can see value in ecosystem services they are more likely to retain them.

Projects and programs that consider integrated management (both grassland and wetland environments) could achieve greater ecosystem service benefits, including carbon management services, on a landscape scale. Considering hydrological processes and sustainable management practices over a wider area can reduce the likelihood of GHG emission hotspots and cumulative effects.

As end-users increasingly expect responsible environmental management associated with production, it will be important to ensure projects and programs are fully sustainable. Knowledge and expertise within roundtables and industry leads, such as Canadian Roundtables on Sustainable Beef (CRSB) and Sustainable Cropping (CRSC), can be utilised to ensure sustainability criteria are met without adverse impacts to industry.

8. Conclusions

There are a number of pathways and frameworks that can be leveraged to achieve the carbon management and climate adaptation benefits afforded by wetland and grassland ecosystems. The benefits of green infrastructure have been acknowledged by the Canadian federal government through the provision of funding for green infrastructure investments. There are opportunities for public and private partnerships to enact wetland and grassland retention and restoration projects, financed by public (such as the GIF) and/or private funds.

Pay For Success mechanisms provide innovative frameworks to enable public/private partnerships to enact conservation projects and programs efficiently, whilst apportioning risk to those most able to manage it. The development of conservation and/or carbon offset protocols for wetland and grassland retention and restoration activities is essential to enabling PFS mechanisms to be used to their fullest extent. There are a number of pathways to generation of credits through existing protocols developed both in Alberta, and in other jurisdictions, or through the development of new protocols or conservation offset systems. In lieu of formalised offset credit systems, insetting frameworks could be implemented to leverage private investments, with benefits to both private investors/companies, conservation organisations, and Albertans.

It will fall to the province, conservation organisations, and industry to find the most effective collaborative pathways and partnerships to achieving one of Alberta's most substantial and cost-effective carbon management and climate adaptation tools.

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9. Appendix

10.1 Federal Funding Streams

Bilateral Agreements

$9.2 billion will be made available through **Bilateral Agreements** with provinces and territories over the next 11 years (starting 2018-2019) for priority projects that support GHG mitigation efforts as outlined in the PCF, support the health of the environment such as water and wastewater infrastructure, aid adaptation to climate change, and build cultural and recreational infrastructure. Funds will be allocated on a cost-sharing basis for agreed-to projects; up to 40% federal funding will be available for projects undertaken with NGOs and municipalities, and up to 50% for projects with provincial partners. Importantly, funds will also include target-setting with a monitoring and reporting component to measure outcomes. Negotiations on the allocation of funds through bilateral agreements are ongoing; interested parties could look to engage the GOA on the clear alignment that wetland and grassland retention and restoration activities have with the aims of Bilateral Agreements and green infrastructure, particularly in Alberta.

Green Infrastructure Fund

$5 billion will be allocated over 5 years (starting 2018-2019) through the **Canada Infrastructure Bank** towards green infrastructure projects. Funds will be made available to initiatives that support the implementation of the PCF, reduce GHG emissions, invest in clean and safe water and wastewater, and will aid adaptation to a changing climate. $2 billion of the GIF will flow through Infrastructure Canada's 'Clean Water and Wastewater Fund' (CWWF), which will finance up to 50% of project costs, including, "rehabilitation of water treatment and distribution systems, and wastewater and storm water collection, conveyance and treatment systems", and, "the construction of naturalised systems for management and treatment of wastewater and storm water". CWWF projects will be identified by provinces and territories, in collaboration with municipalities, and funds are available to provinces and territories, and other entities providing water or wastewater services as identified by provinces, territories, or municipalities. Discussions with the GOC have suggested that wetlands and grasslands are considered important green infrastructure components, and that partnerships with provincial governments could access funds to retain and develop green infrastructure priorities.

Disaster Mitigation and Adaptation Fund

This fund is **national** in scope, and will receive $2 billion to support national, provincial, and municipal infrastructure required to deal with the effects of a changing climate. The DMAF will be a cost-shared fund

with municipalities and provinces to develop targeted infrastructure projects. Projects that provide infrastructure to alleviate the impacts of flooding are likely to be a key target area, in addition to projects that aid prevention and mitigation of wildfire events. It is clear that wetland and grassland retention and restoration activities in both the White and Green Zones of Alberta achieve significant climate mitigation and adaptation advantages.

Low Carbon Economy Fund

$2 billion will be made available over 5 years to support provincial and territorial actions towards the aims of the PCF, in particular those that reduce GHG emissions, are incremental to current plans, and achieve significant reductions towards Canada's national 2030 target. Further details on fund allocation are expected soon. While the current description of fund allocation makes no explicit statements regarding the use of land-based emissions offsets or reductions, reference is made to programs that develop climate change adaptation and resiliency, achieve action on short-lived climate pollutants, and projects that yield the greatest absolute GHG emission reductions for the lowest cost. At this time it is not expected that the LCEF will be a significant source of funding for wetland and grassland retention and restoration activities. However, the recognition of the importance of biological offsets in the Pan-Canadian Framework on Climate Change and Clean Growth, and the current lack of detailed information on LCEF allocation, indicate that attention should be given to further announcements.

10.2 The Verified Carbon Standard Additionality Criteria

The Verified Carbon Standard assesses additionality based on:

1. Identification of alternative land use scenarios in the baseline.
2. Investment/Financial additionality – whether the project condition is less financially viable than the baseline (conversion).
3. Barriers – identification of barriers to project implementation, including financial, institutional, technological, social, common practice, ecological conditions, and land use practices.

   "Sub-step 3a. Identify barriers that would prevent the implementation of the type of proposed project activity
   Part c) Institutional barriers, inter alia:

   i) Risk related to changes in government policies or laws;

   ii) Lack of enforcement of forest or land-use-related legislation."

4. Common practice analysis – what is the common practice in comparable areas (Verified Carbon Standard 2012).

10.3 Existing Grassland Carbon Offset Protocols

Table 1: Protocols for Grassland Retention, Restoration and Management

Protocol Name	Key Activity	Eligible in Alberta	System/Program
Avoided Conversion of Grasslands and Shrublands to Crop Production	Retention	Yes	ACR
Compost Additions to Grazed Grasslands	Management	Yes	ACR
Grazing Land and Livestock Management	Management	Yes	ACR
Avoided Grassland Conversion Protocol	Retention	No – USA only	CAR
Continuous Conservation Tillage and Conversion to Grassland Soil Carbon Sequestration Offset Project Protocol	Restoration	No – USA only	CCX
Sustainably Managed Rangeland Soil Carbon Sequestration Offset Project Protocol	Management	No – USA only	CCX
Methodology for Avoided Ecosystem Conversion	Retention	Yes	VCS
Adoption of Sustainable Agricultural Land Management	Retention, Restoration, Management	Yes	VCS
Soil Carbon Quantification Methodology	Retention, Restoration, Management	Yes	VCS
Methodology for Sustainable Grassland Management	Restoration, Management	Yes	VCS
Methodology for the Adoption of Sustainable Grasslands through Adjusted Management of Fire and Grazing	Management	Yes	VCS

10.4 Green Bond Principles

Voluntary best practice guidelines, "Green Bond Principles" (GBPs) have been developed for the issuance of green bonds, detailing the importance of tracking funds to 'green' projects, selection and evaluation of 'green' projects, and reporting/information sharing (International Capital Market Association 2016). However, the market is in its infancy and the definition of a 'green' project is largely left to the issuer, although an external review is highly recommended. However the GBPs describe a green project as, "providing clear environmental benefits, which will be assessed and, where feasible, quantified by the issuer", and describes several indicative broad categories of green projects, many of which align with wetland and grassland retention and restoration activities (International Capital Market Association 2016):

- Pollution prevention and control – including GHG control, soil remediation
- Sustainable management of living natural resources – including sustainable agriculture, forestry, and climate smart farming
- Sustainable water management – including sustainable infrastructure for clean water, flood mitigation
- Climate change adaptation
- Biodiversity conservation

10.5 Pay For Success Mechanisms

In the descriptions below, conservation offsets could take the form of carbon offsets in a voluntary or compliance carbon offset system, or other verified conservation offsets, such as those being developed for the Alberta conservation offset system.

Partial Pay for Success

Capital payments are divided into an initial payment to implement the project, and a second payment once verified conservation outcomes are achieved.

Public-Private Partnership with Project Seed Funding

Public funds are used as capital to implement a project, and are recouped via the sale of conservation offsets bought by the private-sector. Capital funds can be less than the project cost since producers stand to profit from the sale of conservation offsets.

Full Delivery

Private-sector investments provide the capital to implement a project, such as through the sale of green bonds. Conservation offset buyers agree a set price for purchase of verified offsets with the outcome producers. The producers can then repay investors at the set price, and have the opportunity to generate income depending on cost of implementation and demand and price for conservation offsets (such as voluntary offset projects).

Entrepreneurial Banking

This is the purest form of PFS where private capital investment in a conservation project is repaid by the outcome producer once conservation offsets have been sold to a buyer. All financial agreements are private transactions although public agencies may act as administrators to review, monitor and verify offsets. The outcome producer may bank offsets for later sale to buyers.

Exclusion Rationale

The “Partial Pay for Success” mechanism is excluded from this discussion since it is suited to small-scale projects where sale of offsets is infrequent or uncertain; it is expected that a wetland and grassland retention and restoration project in Alberta will be large-scale. The “Entrepreneurial Banking” mechanism is targeted to projects there is a clear and high demand for conservation offsets, and offset verification is well-defined and established; it is therefore excluded in this report since Alberta does not yet have a verification process for conservation offsets produced by wetland and grassland retention and restoration, and market demand for conservation offsets is not guaranteed.

10.5.1 Public Private Partnership with Project Seed Funding Mechanism

Figure 3: Diagram of Public-Private Partnership with Seed Funding Mechanism (Sokulsky and Alexandrovich 2016)

Figure 3 outlines the process involved in the PPP mechanism (Sokulsky and Alexandrovich 2016):

- The conservation buyer (2) is expected to be a government agency that uses public funds to provide partial capital funds for projects it deems to have the most potential, via solicitation of letters of interest (1).
- Funds are allocated to a conservation outcome producer (3) with a financial agreement for repayment (7) once pre-determined conservation outcomes (4) are verified (5).
- Conservation offsets (credits in the diagram) are sold to private-sector buyers (6); some funds generated from the sale are returned to the conservation buyer (7).

[Note: The application of this framework to projects located on public lands will depend on definition of offset ownership in relevant offset protocols, and contracts between public agencies, private investors, disposition holders, and project implementers (e.g. conservation professionals, industry).]

10.5.2 Full Delivery Mechanism

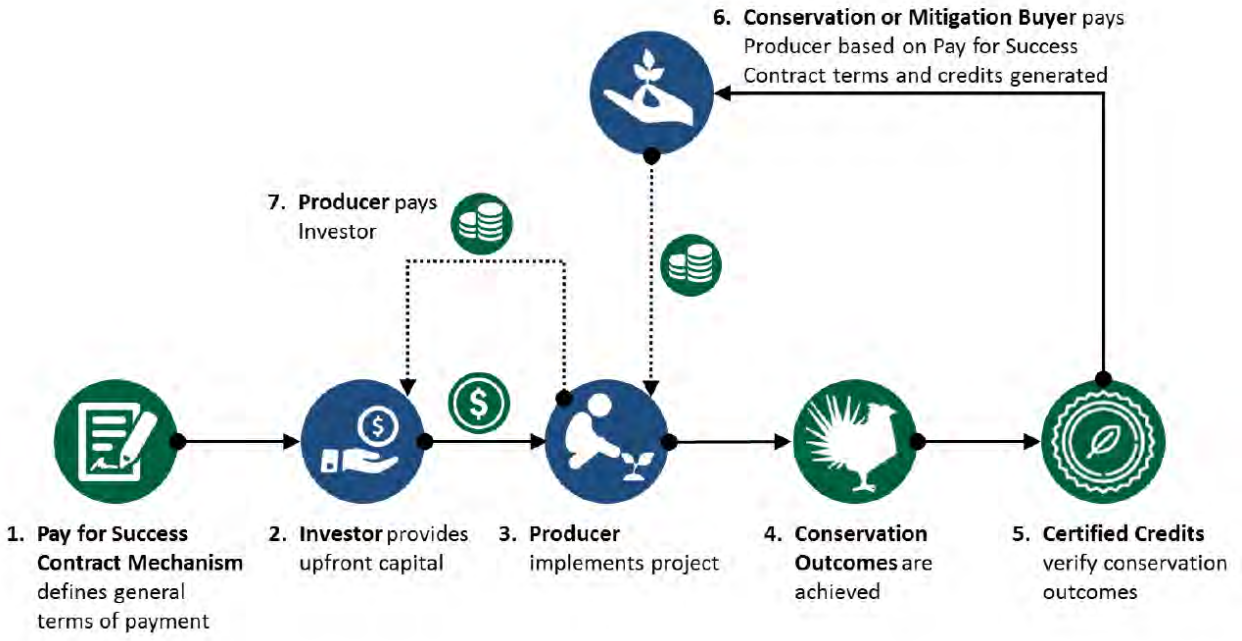

Figure 4: Diagram of Full Delivery Mechanism (Sokulsky and Alexandrovich 2016)

Figure 4 describes the Full Delivery mechanism:

- Initially a contract is made between a buyer of conservation offsets (pending verification and sometimes including a maximum rate of conservation offset purchase), and the producer (1).
- The contract allows the producer to secure capital to finance the project (2). Capital financing could take the form of a loan, but could also utilise green bond sales (see *6.2.3 Green Bonds* above), or investments from insetting projects (see *6.2.4 Insetting in Supply Chains* above), or could employ a payment in lieu contract where a conservation offset buyer pays for conservation offsets before the project has been implemented, which are repaid upon later verification and sale of offsets by the producer.
- Upon verification of conservation outcomes (5), the producer sells the conservation offsets (credits in the diagram) to the buyer under the initial contract (6).
- The producer can sell any remaining offsets to other buyers for a profit. The producer then repays the capital investor (7) according to the financial agreement.

[Note: The application of this framework to projects located on public lands will depend on definition of offset ownership in relevant offset protocols, and contracts between public agencies, private investors, disposition holders, and project implementers (e.g. conservation professionals, industry).]

10.6 California Dairy Industry – An example of how a PFS mechanism could utilise public funds to set minimum conservation offset prices

California provides an example of where the PFS framework could be utilised to reduce methane emissions from the dairy industry. It is expected that direct state investments of $100 million per year will be needed to build an estimated 200 anaerobic digesters to produce biogas and reduce methane emissions (California Air Resources Board, 2017).

A key barrier to the uptake of projects to generate and sell offsets (carbon or otherwise) is market uncertainty. To address this issue, The World Bank has set up a Pilot Auction Facility to research and demonstrate the use of 'put options' in the sale of carbon offset credits, through different auction approaches (World Bank Group, 2017). Put options are contracts that give the owner of offsets the right, but not the obligation, to sell offsets to the buyer, effectively setting a guaranteed price floor for offset credits. Instead of providing upfront grants for projects which area short term and don't recognize the ongoing benefits being provided as has previously been the case, the state could utilise funding to buy verified methane reduction offsets as a buyer of last resort via put options.

The Climate Trust recently applied and was awarded a USDA Conservation Innovation Grant to pilot a put option program titled, "Environmental Price Assurance Facility" (EPAF). The pilot aims to create an incentive-based program to incent the use of anaerobic digesters to reduce methane emissions from dairy farms, pre-empting the need to implement methane regulations. Project owners are then able to secure capital investment from the private sector with a guaranteed buyer of verified offsets. Based on research by The Climate Trust, EPAF funds are anticipated to leverage $2 of private carbon finance investment, and $4.70 of traditional capital financing, for every $1 of price guarantee in the EPAF. Project developers can sell generated offsets to other buyers at a higher price than the state purchase price, if they wish (The Climate Trust, 2017).

In the worst-case scenario, the EPAF will be utilised to pay for verified methane reductions, therefore achieving environmental outcomes at an agreed price. However, the anticipated outcome is that put options are not exercised, offsets are purchased at a higher rate than the EPAF put option price by the private-sector, and the EPAF funds are recycled to new risk mitigation or put options.