EVALUATION OF THE PRIMARY INDUSTRIES CLIMATE CHANGE RESEARCH STRATEGY

Prepared for NSW Department of Primary Industries

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Clear Horizon

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Dictionary

Acronyms	Description
DOC	A unique identifier from the document register referring to a piece of documentary evidence used in this evaluation
DPI	NSW Department of Primary Industries
MoG	Machinery of Government
PICCRS	Primary Industries Climate Change Research Strategy
SSMW	Strategy Sense Making Workshop

Declaration

The author of this report was an employee of DPI Agriculture until the end of 2020 and originally created the Evaluation Plan for the PICCRS. The report has been prepared consistent with the Australian Evaluation Society's Guidelines for the Ethical Conduct of Evaluations and Code of Ethics.

Evaluation of NSW Primary Industries **Climate Change Research Strategy**

2018-2023

Evidence used for this evaluation:

83 Documents reviewed

4 Evaluation reports

6 Evidence tables

4 Sensemaking workshops

Evaluation report overview:

7 PROJECTS

3 THEMES

$29.2m NSW CLIMATE CHANGE FUND including:

- **$11.7m** ENERGY
- **$2.8m** CARBON OPPORTUNITIES
- **$14.7m** CLIMATE RESILIENCE

This summative evaluation delivers on DPI's funding obligations while supporting its ambition to learn and improve program design and implementation to deliver better outcomes for stakeholders.

KEY EVALUATION QUESTIONS & FINDINGS

1. Was the Strategy delivered as planned and regular reviews completed and learnings implemented? The projects were delivered with a significant amount of adaptive management in response to a range of challenges

2. How effective has the Strategy been in achieving its expected outcomes? All the projects have produced outputs that have contributed to the desired outcomes.

3. How did the Strategy contribute to DPI Strategic Outcomes? The PICCRS contributed to DPI strategic outcomes by demonstrating the importance of proactively developing solutions and responding to opportunities for primary industries in a changing climate.

4. How did the Strategy contribute to CCF purposes? The Strategy contributed to the CCF purposes by raising awareness and providing information for primary industries and government on energy demand, alternate energy supply options and future investment possibilities.

KEY RECOMMENDATIONS

That DPI:

- Continue efforts to address the organisational systems and processes that impede efficient project management,
- Prioritises delivering large portfolios of work that bring critical mass and expertise, reduce fragmentation, and more clearly establish its value proposition.
- Maintain and evolve a high-level governance group to support collaboration and good governance in relation to climate change, adaptation and mitigation.
- Places greater emphasis on resource planning including have dedicated coordination staff supporting and encouraging project managers to properly cost all facets of project management and governance.
- Builds on the measurement, evaluation and reporting (MER) exemplar delivered by this Strategy, including using it to support regular reviews, and identifying and applying lessons learned.
- Continues efforts to share the knowledge and insights generated by the Strategy.

This report has been prepared by Clear Horizon Consulting for the NSW Department of Primary Industries as part of the Climate Change Research Strategy.

INTRODUCTION

The Primary Industries Climate Change Research Strategy (CCRS) was a $29.2 million portfolio of work funded by the NSW Climate Change Fund (CCF).

It was delivered between July 2018 and June 2023. It is comprised of seven individual projects working across three theme areas of energy, carbon opportunities and climate resilience.

Purpose of this evaluation:

As part of the funding agreement with the CCF the CRRS must be evaluated.

This report satisfies this requirement for a summative evaluation, as well as furthering DPI's ambition to learn and improve program design and implementation to deliver better outcomes for its stakeholders.

FINDINGS AND RECOMMENDATIONS AGAINST THE KEY EVALUATION QUESTIONS

KEQ 1. Was the Strategy delivered as planned and regular reviews completed, and learnings implemented?

The projects were delivered effectively although not always as planned. In the operating context, Machinery of Government (MoG) changes, delays in public announcements and also unprecedented extrinsic events including drought, bushfire, flood, biosecurity events and COVID-19, caused significant interruptions to project delivery.

Internally, there were a variety of system and process barriers which were time consuming for project teams to navigate. Access and support from shared services did not always work well. Project teams often developed work arounds to maintain momentum.

Projects were agile and adaptive in responding to these challenges. Monitoring, evaluation and reporting processes were applied at the project and Strategy level to identify lessons learned which were used to improve the remaining implementation.

Governance arrangements, including the CCRS Governance Group (GG) and procurement and probity frameworks have provided value to the implementation of the strategy. The GG provided opportunities for reflection and refocusing and has enhanced collaboration across DPI branches.

There was mixed success using project-level steering groups which can be improved in the future by Project Leads having access to appropriate advice and training.

FINDINGS:

- The projects were delivered with a significant amount of adaptive management in response to a range of challenges. Many of these challenges related to external events including natural disasters and COVID. Project teams demonstrated creativity and tenacity to adapt and deliver in the face of these challenges.
- The Strategy-level governance arrangements consistently provided support and added value. Success with governance arrangements at the project-level was variable, with valuable lessons learned.
- Organisational systems, processes, and shared services presented barriers to efficient delivery and the projects had to find creative work arounds. Project management processes evolved throughout delivery to support better implementation.
- Formal and informal learning processes have been employed throughout delivery to the benefit of the Strategy.

RECOMMENDATIONS:

- That DPI continue efforts to address the organisational systems and processes that are impeding efficient project management
- That DPI places a greater emphasis on resource planning, particularly shared services
- That DPI maintains and evolves a high-level governance group to support collaboration and good governance in relation to climate change, adaptation and mitigation

KEQ 2. How effective has the Strategy been in achieving its expected outcomes?

The projects within the PICCRS strategy made a significant contribution to producing new knowledge that has directly informed government policy and programs.

Key contributions include:

- A consistent assessment of the vulnerability of key primary industry commodities and biosecurity risks to climate change NSW to a level not previously undertaken
- the development and implementation of ag-tech solutions to better manage climate risks through better access to high resolution and timely information
- Pilots creating opportunities for energy intensive primary industry sectors to trial and experience renewable energy solutions on-farm
- Reports informing key agricultural sectors how to improve energy productivity
- Practical information showing pathways for farmers and industry on transitioning to renewable energy
- Information for farmers about how to participate in carbon markets
- Information about the viability of alternate energy sources including biomass for bioenergy
- An assessment of the Abatement opportunities in NSW Agriculture
- In some instances, outputs were not able to be delivered in the Strategy timeframe. This occurred for a range of reasons and it is likely that the outcomes of the Strategy will continue to materialise following its conclusion as the knowledge and insights continue to be disseminated and are adopted by stakeholders.

FINDINGS:

- All projects have influenced (or there is evidence they are likely to influence) future work programs.
- Four of the seven projects have influenced (or there is evidence that they are likely to influence) policy.
- All projects have produced knowledge and information to inform policy and future work programs.

RECOMMENDATIONS:

- That DPI prioritises delivering large portfolios of work that will bring significant funding to support resource optimisation, reduce fragmentation, and more clearly establish its value proposition
- That DPI continues to share the knowledge and insights generated by the Strategy to ensure the potential extent of the outcomes are optimised
- Builds on the measurement, evaluation and reporting (MER) exemplar delivered by this Strategy, including using it to support regular reviews, and identifying and applying lessons learned

KEQ 3. How did the Strategy contribute to DPI Strategic Outcomes?

The projects contributed directly to the DPI Strategic Outcomes that were current at the time.

They have gone on to directly shape DPI's updated strategic direction, with a new strategic priorities of "Carbon Neutrality and Climate Resilience", included in the DPI 2022-2030 Strategic Plan.

The Vulnerability Assessment has been called out as being foundational to DPIs future investment decisions due to the insights that have been generated around quantifying climate risks for key agricultural industries.

The continued funding of the project will also identify meaningful adaptation options.

In some areas, like energy, the work delivered under the Strategy has helped to more clearly articulate what DPI's future role in climate change research, development and adoption.

FINDINGS:

The PICCRS contributed to all but one of the DPI Strategic Outcomes from the 2019-23 Plan and was influential in the development of the new Carbon Neutrality and Climate Resilience Strategic Outcome from the 2022-2030 Plan.

KEQ 4. How did the Strategy contribute to CCF Purposes?

The projects contributed effectively against CCF purposes as follows:

- Reduce GHG emissions and climate change impact associated with water and energy 4/7 (projects 1, 3, 4, 5)
- Encourage energy and water savings/ recycling 1/7 (project 2)
- Reduce demand for water and energy 1/7 (project 1)
- Stimulate investment in innovative energy and water savings 2/7 (projects 1, 2)
- Increase public awareness and acceptance of the importance of climate change and water and energy savings measures 4/7 (projects 2, 4, 6, 7)

FINDINGS:

The Strategy contributed to the CCF Purposes by raising awareness and providing information for primary industries and government on managing energy demand to reduce greenhouse gas emissions, alternate renewable supply options to reduce greenhouse gas emissions, where investment should be focused to address future climate change impacts.

1. ABOUT THE CLIMATE CHANGE RESEARCH STRATEGY

NSW's $23.1 billion primary industry sector operates in one of the most variable climates in the world. Primary producers already deal with a changing and variable climate by responding to droughts, floods, storms, bushfires, and pests and diseases.

Climate projections indicate that in the future, areas of NSW are likely to face decreasing winter and spring rainfall, increased intensity of extreme rainfall events, increasing day and night temperatures, fewer frosts, and harsher fire weather. Evidence suggests that these changes are already impacting on agricultural productivity, water availability, soils, and the spread of pests, weeds, and disease. As our climate changes, these challenges are expected to increase. Having a clear picture of which primary industry sectors are most vulnerable to change is critical to inform the strategic responses required from both industry and government.

The challenges presented by climate change are now well recognised by scientific organisations, rural research providers, and peak farming groups, as evidenced by industry adopted carbon targets and climate related research and development strategies. Recent climatic events, including severe drought, heat wave conditions, bushfires and floods across Eastern Australia, have highlighted the sensitivity of primary industries to climatic conditions and the importance of coordinated responses from industry and government. NSW DPI continues to work closely with industry on addressing these challenges, as building in ownership of the outcomes of research and development is critical to effectively tackling the challenge. The strong governance arrangements in place have helped ensure that such parties played a key role in guiding the delivery of the Strategy.

NSW DPI also understood that inadequate climate change adaptation information, research and data is a barrier to effective climate change adaptation, hence the research and development focus of the Strategy. Many of the projects included pilots to test the effectiveness of new technologies and approaches, reducing uncertainty about the benefits of technologies and the risks of adoption. Individual farmers, critical industry groups and universities have had direct involvement across the strategy ensuring that DPI's research was targeted and delivered fit for purpose information and recommendations. DPI has had a long history of demonstrating the practical application of new technologies in primary industries.

In addition to the challenges of a changing climate, energy security and affordability continue to be critical issues for the sector. Energy is a fundamental input to the primary industries sector, whether for irrigation, fuelling tractors and boats, or refrigerating packing sheds. The Strategy sought to address these issues by investigating the potential to improve energy demand management, as well as testing the feasibility of alternative supply options. The outcomes of this research will boost the resilience of these sectors and actively contribute to reducing the emissions produced by those industries.

There are also opportunities for primary industries to respond with productivity and innovation to climate change. These include establishing new industries or expanding existing ones. The opportunities for primary industries in meeting greenhouse gas mitigation targets through land-based sequestration and market opportunities have grown significantly over the course of the strategy. The Strategy on a page is represented below.

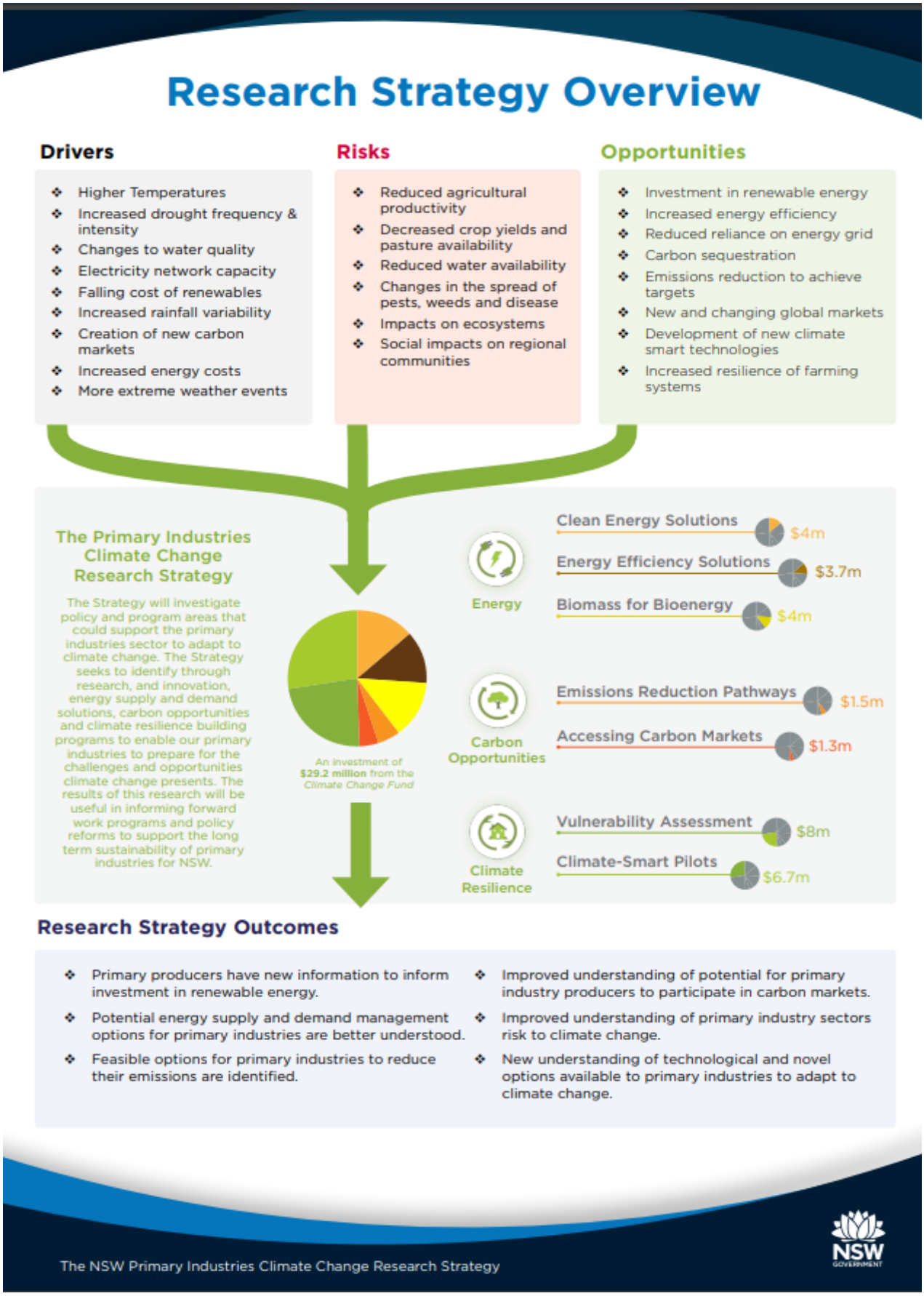

Figure 1 The Primary Industries Climate Change Research Strategy on a page

As shown in Figure 1, the Strategy was made up of seven projects. A brief description of each project is provided in Table 1. Henceforth in this report, projects will be referred to as Project 1 and 2, Project 3 etc.

Table 1 Summary of the PICCRS projects

Project #	Theme area	Project Name	Description
1	Energy	Clean Energy Solutions [1]	Identify and reduce barriers to adoption of innovative, implementable energy supply solutions and network configurations, that will reduce energy costs and emissions and improve energy security, through research and feasibility studies
2		Energy Efficiency Solutions [2]	Deliver an extension program of relevant and practical solutions for introducing renewable energy and improving energy efficiency including pilots demonstrating new technological developments.
3		Biomass for Bioenergy	Investigate opportunities for increasing the amount of sustainable biomass use in NSW with a focus on electricity generation, including identification of available and potential feedstocks for bioenergy generation at varying scales, with an understanding of techno-economic and social constraints.
4	Carbon Opportunities	Emissions Reduction Pathways	Quantify the sustainable potential for emission reductions and carbon sequestration in the NSW primary industries sector to contribute to the NSW target of net zero emissions by 2050 and develop scenarios and policy recommendations to achieve this potential.
5		Accessing Carbon Markets	Investigate existing Emission Reduction Fund (ERF) abatement activities, as well as agricultural production, resource condition and resilience at farm and regional scales, to provide a clearer understanding of the impacts and uncertainties relating to carbon farming and land-use change. The project also investigates the added benefits to the environment and agricultural production that could come from carbon farming.
6	Climate Resilience	Vulnerability Assessment	Improve the understanding of climate change risks and impacts to targeted primary industry sectors, identify adaptation priorities for targeted primary industry sectors, and support industry to better plan and respond to climate change.
7		Climate Smart Pilots	Support primary industries across NSW in responding to climate variability and change via:

[1] Note that projects 1 and 2 were merged in late 2020

			• technology pilots: by providing practical demonstrations of how digital technology and improved access to real time information helps decision making about climate events • adaptation pilots: how other adaptation options can be used to manage climate variability.

Figure 2 shows the alignment of the PICCRS and its projects with the authorising environment current at the time of the Strategy's commencement (2018).

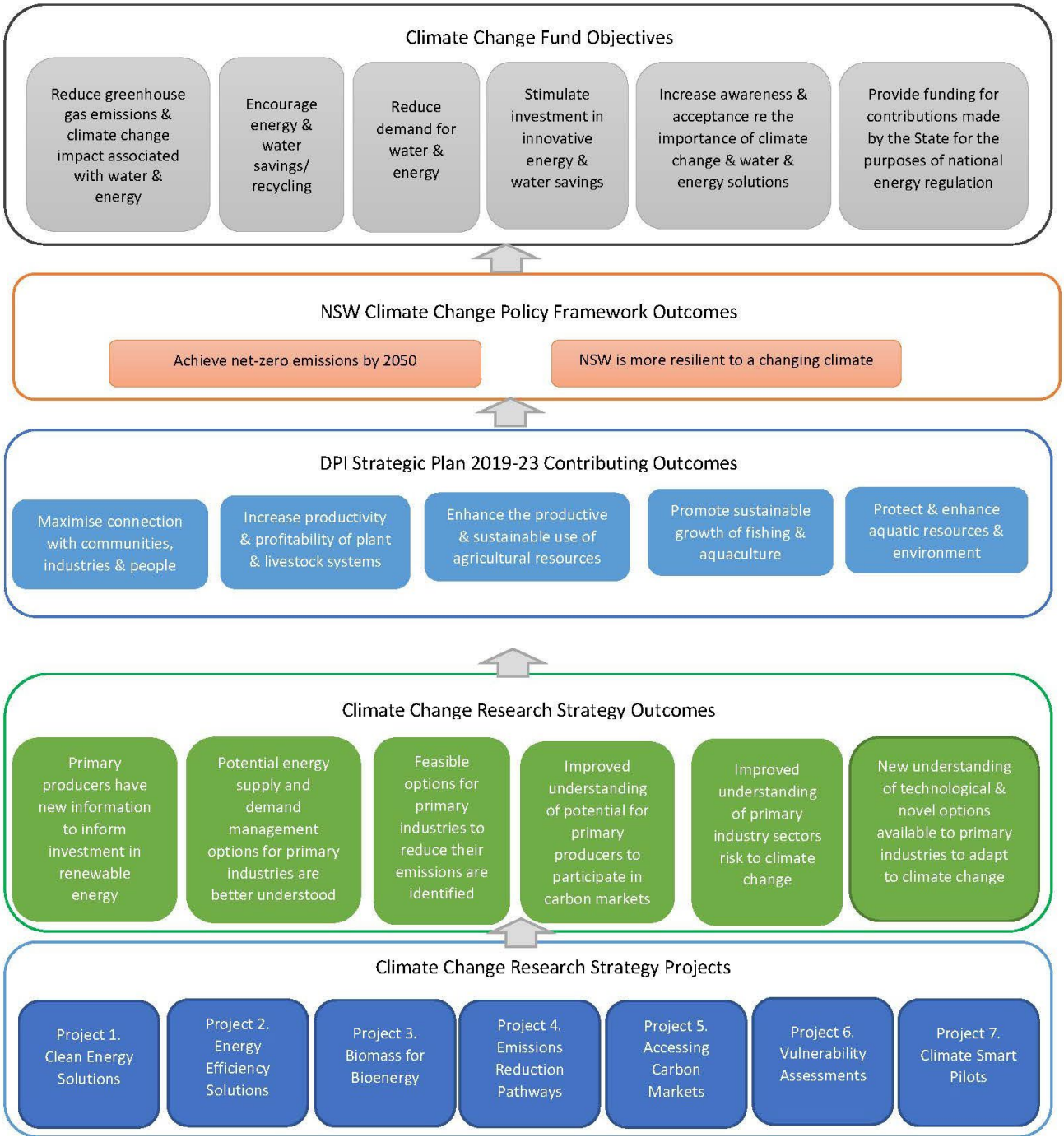

Figure 2 Alignment of PICCRS with broader strategic context

Each project was also mapped against the outcomes of the Strategy as per Table 2.

Table 2 Project alignment with Strategy outcomes

Strategy outcome	Contributing projects
Primary producers have new information to support and inform investment in renewable energy	Clean Energy Solutions Energy Efficiency Solutions Biomass for Bioenergy
Potential energy supply and demand management options for primary industries are better understood and communicated	Clean Energy Solutions Energy Efficiency Solutions Biomass for Bioenergy
Feasible options and investment pathways for primary industries to reduce their emissions are identified and communicated	Clean Energy Solutions Energy Efficiency Solutions Emissions Reduction Pathways Accessing Carbon Markets
Improved understanding of potential for primary industry producers to participate in carbon markets	Emissions Reduction Pathways Accessing Carbon Markets Biomass for Bioenergy
Improved understanding of primary industry sectors' risk to climate change	Vulnerability Assessment Climate-Smart Pilots
New understanding of technological and novel options available to primary industries to adapt to climate change	Energy Efficiency Solutions Biomass for Bioenergy Climate-Smart Pilots

2. ABOUT THIS EVALUATION

2.1. Approach and method

Evaluation plans for the Strategy and the individual projects were developed in 2018. These plans have guided this evaluation. This evaluation is primarily a component evaluation as defined by Davidson[2] and is intended as a summative or outcome-focused evaluation.

> *"A form of analytical evaluation in which the quality or value of the evaluand[3] is determined by evaluation each of the evaluand's components (or parts) separately and then (usually) synthesising these findings to draw conclusions about the evaluand as a whole."*

Each of the individual projects has been evaluated. These evaluations were conducted by independent internal DPI evaluators and were overseen by Clear Horizon to support an appropriate level of rigour.

Meta-analysis of the project-level evaluations was completed against the Strategy-level KEQs. For additional depth of insight, an analysis of Strategy-level documentation was conducted, as well as targeted interviews with key stakeholders. A sensemaking workshop with key Strategy stakeholders was also undertaken to validate the draft findings against their experience, including the identification of any evidence sources that the evaluation team may not have had access to.

2.2. Limitations

There are several limitations relevant to this evaluation that should be considered when reading this report:

- Due to a range of technical and resourcing difficulties, Project 4 could not be completed by the end of the Strategy timeline. The available data was collated in an evidence table, though some key outputs, and subsequently the project level evaluation had not yet been delivered.
- There was a limited amount of time between the other project-level evaluations being completed, key outputs being made available, and the due date of this Strategy-level evaluation report. This has limited additional data collection.
- The strength and comprehensiveness of data is variable across projects.
- The planned economic KEQ will not be answered as the projects within scope have not been in place long enough for sufficient data to have been generated to enable such analysis.
- The design of the evaluation approach developed in 2018 is representative of organisational evaluation maturity at the time. As such, one judgement-based question is guided by a rubric. The standards of this rubric relate to yes/no rather than more sophisticated articulations of significance.

Notwithstanding these limitations, this report provides a meaningful and useful contribution to understanding the value of the PICCRS, supports DPI organisational learning, and demonstrates appropriate levels of accountability to the CCF.

[2] Davidson, E. J. (2005). *Evaluation methodology basics: The nuts and bolts of sound evaluation*. Sage.
[3] Evaluand: the thing that is being evaluated

2.3. Key evaluation questions

This evaluation responds to four key evaluation questions as shown below.

Table 3 Key evaluation questions addressed in this report

KEQ	Sub-questions
1. Was the Strategy delivered as planned and regular reviews completed and learnings implemented?	1 a. Were the projects delivered as planned, if not, what changed and why? 1 b. How effective have the systems and processes been to support the delivery of the Strategy? (governance, internal/external communications, etc.)
2. How effective has the Strategy been in achieving its expected outcomes?	2 a. Have the projects produced knowledge and information to inform policy and future work programs? 2 b. How satisfied are the research users of the knowledge and information that has been produced by the projects? 2 c. To what extent have the projects influenced (or are likely to influence) policy? 2 d. To what extent have the projects influenced (or are likely to influence) future work programs?
3. How did the Strategy contribute to DPI Strategic Outcomes?	No sub-questions were set for this KEQ
4. How did the Strategy contribute to CCF purposes?	No sub-questions were set for this KEQ

While findings are made against all KEQs, only KEQ 2 has a judgment made against it. This is guided by the rubric that was developed as part of the Overarching CCRS Evaluation Plan (see Appendix 2).

2.4. Summary of data used to inform this evaluation

This evaluation has drawn on a range of evidence sources. All evidence sources are referred to with a document reference as per the document register in Appendix 1 Document Register, except for the sensemaking workshops (referred to as SSMW for Strategy-level, or SMWX for project-level) and interviews conducted for the purpose of this evaluation (Interviewee). These are summarised in Table 4.

Table 4 Evidence used to inform this evaluation

Evidence source	Number
Project evaluation reports	4 (project 1 and 2 is a combined report)
Project evaluation evidence tables	6 (project 1 and 2 is a combined evidence table)
Documents (includes project-level interview transcripts)	427 (83 were reviewed in detail).
Attendance at sensemaking workshops	4
Interviews	3

3. FINDINGS

KEQ1. Was the Strategy delivered as planned and regular reviews completed and learnings implemented?

1 a. Were the projects delivered as planned, if not, what changed and why?

Finding

The projects were delivered with a significant amount of adaptive management in response to a range of challenges which were cumulative over the course of implementation. Many of these challenges related to external events including natural disasters and COVID. Project teams demonstrated creativity and tenacity to adapt and deliver in the face of these challenges.

In the operating context, **Machinery of Government (MoG) changes** and **delays in public announcements** caused significant disruptions and delays. **Several unprecedented extrinsic events** occurred during the period of implementation including drought, bushfire, flood, biosecurity events and COVID-19, also had direct impacts on project delivery.

One of the major implications of these disruptions was **ongoing budget underspends** (DOC53, DOC54, DOC61, DOC64), with variance between planned and actual expenditure for overall project budgets only starting to reduce towards the end of the funding period, i.e., March 2023 (DOC86). This was achieved by **semi-annual budget reviews**, which sought to bring forward expenditure where possible to manage the need for carry forwards. These reviews also informed the recommendation to the Governance Group in December 2020 to **seek an extension to the funding arrangements**. The administrative burden associated with scoping that extension was considered before proceeding with that action (DOC67) which has ultimately proven to be necessary and helpful.

There were multiple MoG changes of varying scales during implementation, ranging from changes in Minister, to DPI being moved from one NSW Government cluster to another. This caused **disruptions to corporate management systems and support**, e.g., there have been four new or iterated financial management systems during the term of the Strategy, as well as **shifting priorities and interests**.

The teams were proactive in advising of opportunities for announcements and launching of project activities (DOC255), however there were Ministerial announcement delays at the time (2018-2019) which affected delivery timelines and expenditure (DOC67). In some cases, this was in the form of underspends and, in other cases, impacted project budgets, project outputs and industry partners, as costs and interest rates increased (DOC405).

Force majeure events affected all projects. In some instances, **on-ground works could not be established due to drought**. In other cases, **sites could not be accessed due to COVID-19** restrictions, which impeded planned engagement and management/maintenance activities (DOC405, DOC408), and some established **pilot sites were damaged during flood events**.

These challenges were cumulative, however there is evidence to demonstrate that **all projects were agile and adaptive in responding to the circumstances**, to successfully deliver outcomes. Some examples include:

- Projects 1 and 2 were merged in 2020/2021 to increase efficiency around stakeholder and steering committee engagement (DOC405).
- Project 3 was unable to establish or delayed plantings at some sites due to the ongoing drought. This was the catalyst for exploring the possibility of extending funding arrangements, as the biomass crop trial harvests (which required at least 3 years of growth) were essential to generate the required data. COVID-19 restrictions meant project staff were unable to travel to trial sites, and instead tapped into regionally based staff to assist with tasks (DOC406). As Project 3 was unable to access the desired communications support, one project team member also upskilled to create their own graphics and communication products including crop trial videos, images and accessible documents for the project website, and design work for crop trial road signs (DOC406).
- Project 7 initially planned to use grants for a part of the approach to adaptation pilots however this was proved difficult in practice. Both the Commonwealth and NSW governments were carefully managing media announcements and the grants space as they released large volumes of response and recovery grants funding following the compounding natural disasters of 2019/2020. The project adapted again when COVID-19 restrictions meant the planned intensive engagement for field days could not be implemented and instead shifted to developing demonstration farms and case study materials (DOC408).

These adaptive responses to the external context have allowed **the Strategy** to be **delivered within the renegotiated timeframe and within the original budget** of $29.2 million. The outcomes that have been achieved as a result are discussed in KEQ2.

1 b. How effective have the systems and processes been to support the delivery of the Strategy? (governance, internal/external communications, etc.)

Finding

The Strategy-level governance arrangements have been innovative in the DPI context and have consistently provided support and added value. Success with governance arrangements at the project -level was variable, with valuable lessons learned.

Organisational systems, processes, and shared services presented barriers to efficient delivery and the projects had to find creative work arounds. Project management processes within the control of the Strategy evolved throughout delivery to support better implementation.

Formal and informal learning processes have been employed throughout delivery to the benefit of the Strategy as well as generating lessons to inform similar future portfolios of work.

Governance arrangements, including the CCRS Governance Group (GG) which included representation from across relevant DPI branches, as well as a procurement and probity framework, were **established at Strategy commencement** (DOC161, DOC236, DOC376). These structures and documents have been maintained for currency (DOC32, DOC201), and **have endured** for the duration of the Strategy's delivery.

The GG has been **managed to a high standard** with attention to detail. This is evident through the focus on identifying and declaring conflicts of interest (DOC67, DOC82, DOC119, DOC136, DOC165), actions being consistently recorded, and status updated as a standing agenda item (DOC67, DOC165, DOC180, DOC185, DOC188).

There is diverse documentary evidence showing the GG provided **opportunities for reflection and refocusing**, as well as environmental scanning to identify opportunities for collaboration with other

entities and to leverage project funding (DOC71, DOC176, DOC180). As the Strategy progressed, the GG matured and started to exercise its influence more fully. For example, it was minuted that the GG requested opportunities for **sharing lessons learned** so other programs could benefit from Strategy experience (DOC180, DOC284, DOC371). Another example was a request from the GG for risks to be more explicitly reported. Subsequently, a standing agenda item was established. Rich detail about risks and the mitigations being employed were tabled at each meeting, with advice on further action sought where mitigations were insufficient (DOC167, DOC243, DOC245, DOC248, DOC249, DOC251, DOC265, DOC269).

The GG reflected on its own value, noting it had **improved collaboration across the agency**, and that the Strategy had catalysed this new way of working (DOC136). Others beyond the Strategy also recognised its value, inquiring as to whether it should endure following Strategy completion to support ongoing collaboration across DPI. An intra-DPI conference raised the possibility of continuing to utilise the GG to support cross-DPI agency collaborations as well as shepherding critical strategic work such as the Climate Roadmap (DOC137), which was ultimately superseded by the updated DPI Strategy (DOC180).

> *"…collaboration across the organisation from this governance group has been really successful and the collaborations across the agency as a result of the CCRS have been new territory and very successful." (DOC329)*

At the project level, there was **mixed success in using project steering committees** (DOC405). This was reflected upon during the project-level sensemaking workshops. Some teams commented that they had a **limited understanding** of the purpose of governance/steering committees **at the outset** however much has been learned, and they now have greater confidence to design and implement appropriate governance arrangements in future (SMW6, SMW7). Other projects benefited significantly from their steering committees and even excelled in how well they were managed:

> *"I think that this program [project] that they ran was the best run program that I've been a part of, the best program full stop, like I'm telling you, it was good. Sometimes it's like a big effort getting 15 people in a room at the right time, but there was always an agenda, there were always speakers. there was always feedback … and they always did the whole notes thing. It was very 100%, it wasn't 80%." (DOC406)*

Project-level evaluation recommendations captured the **importance of designing governance arrangements to suit the needs of individual projects** (DOC409), and the need for **more guidance** to enable researchers to build their governance skills. (DOC410).

There were a variety of **system and process barriers** within NSW DPI relating to project management, financial reporting systems, and accessing the support provided by centralised services such as legal and contracting, communications, and human resources. Many of these barriers were identified in the mid-term evaluation (DOC422) but appear to have persisted.

External factors (as discussed under KEQ1a) created challenges to managing project timeframes and budgets. These were further complicated by organisational project management and financial reporting systems. Project teams reported that these were **difficult to use**, and teams needed help generating accurate reports. This was a source of major frustration and **impeded their ability to interpret the information** (DOC67, DOC71, DOC137) and thus make informed decisions.

Ongoing system disruptions were a flow on effect of MoG changes which made finding a rhythm difficult. The impact was confusion and frustration for project teams, with **additional staff time directed at diagnosing and resolving problems** (DOC70, DOC137, DOC197). There was **ongoing effort to build on project management arrangements** that individual projects utilised to **work around systemic barriers**, improve internal and external communications, and better inform decision making. The introduction of new reporting templates on an annual basis from the CCF administration committee further complicated reporting and gaining the correct approvals for submission.

Shared services did not always provide the anticipated support in an efficient manner. As several projects had non-standard contract requirements (funding agreements, access agreements) with external project partners, advice and support were sought from centralised teams specialising in legal matters and contracts. This process did not run smoothly. Firstly, it was not easy to find the right centralised team (e.g., within DPI or the broader Cluster). Once the relevant contact was engaged, the **generic contracts usually used were unsuitable** for the specific needs of the projects, leading to a **protracted process** to establish more appropriate contracts (DOC405, DOC408, DOC424). This subsequently impacted on the ability to deliver the projects in line with their scheduled milestones, resulting in spending delays and some project contractors working under good faith agreements while contracts were processed (DOC137).

These challenges were reflected on at the SSMW. While work is underway to remediate some system challenges, thought needs to be given to **more detailed planning around resourcing requirements from shared services, and the model used to deliver them**. One participant highlighted that, where there were dedicated resources, e.g., for monitoring and evaluation, that had mostly worked well, though that was less often the case when services were shared. There was a discussion on the different models that could be used to support resourcing in future.

> *"I think one of the things that we failed to do is just put it into our project costings. You don't cost in [price] the cost of the lawyer to negotiate the contracts and those sorts of things that you need the help on. Now you actually have to pay for [those costs] as part of the project." (SSMW)*

Organisational systems did not support efficient or meaningful project reporting within DPI and to the CCF. The **team developed their own methods** to try and track and manage projects, and the approach to reporting evolved as the program became more established (DOC254, DOC269, DOC336). Reporting to the CCF was also challenging as reporting templates were very constrained leading to very little information about the program and its achievements being meaningfully reported.

Time was invested in developing and updating a **communications** plan for the Strategy, including a dedicated website (DOC282, DOC329). However this planning did not support resourcing from centralised teams, and **projects continued to struggle to get the level of support they required**.

> *"…getting a website up and running took an awful lot longer and took a lot more energy than was expected and was a source of much frustration by the project leaders, and those things taking time on what should be business as usual, was taking us away from actually delivering on what the projects needed to." (SSMW)*

The mid-term evaluation made it clear that a **new approach was needed**, and a new project was initiated by the Strategy Coordinator to develop the dedicated website (DOC70, DOC260, DOC263, DOC267). This **project gave detailed consideration to user needs** by interviewing a range of different anticipated users (DOC415, DOC416, DOC417, DOC418, DOC419). The dedication of the Strategy Coordinator and active engagement of project staff in this project was critical to its success (DOC137),

with project teams commenting on the benefits of having this dedicated website (DOC70). This helped project teams to proactively engage with key stakeholders and communicate project activities. The GG was provided with regular updates (DOC263, DOC265, DOC287). The Climate Branch also **established an internal Community of Practice to share lessons learned** through the Strategy, focusing on building capacity in relation to stakeholder engagement and communications and website management and content building (DOC264).

The **monitoring, evaluation, and reporting (MER) arrangements supported reflection, learning and improvement**. Project teams participated in a **reflections workshop** in May 2019. The session focused on the planning and early implementation stages of the Strategy. The outputs were documented and tabled to the GG. The **mid-term evaluation was completed** in 2020 (DOC425). The recommendations contained in the report were collaboratively developed by project leaders, the Strategy Coordinator, the Director of the Climate Branch and the Governance Group (DOC426). **Management responses were developed and implemented** against all recommendations, as well as a Lessons Learned presentation prepared to support the **sharing of the insights** generated through the process (DOC317).

KEQ2. How effective has the Strategy been in achieving its expected outcomes?

Finding

All the projects have produced outputs that have enabled them to contribute to the desired outcomes. In reference to the rubric relevant to this question (see below), the program has achieved the standard of ***good*** where:

- all projects **have influenced (or are likely to influence**) future work programs in climate change and energy.[4]
- four of the seven projects **have influenced** (or there is evidence that they are likely to influence) climate and energy policy[5] and
- all projects have produced knowledge and information to have the potential to inform climate and energy policy and related future work programs (see Appendix 3 Summary of knowledge and information produced by projects for summary).

Rubric that has guided the finding against KEQ2

Standard	Description
Excellent	As good, plus: Five projects have influenced (or are likely to influence) policy
Good	As adequate, plus: Three or four projects have influenced (or are likely to influence) policy
Adequate	All projects have influenced (or are likely to influence) future work programs One or two projects influenced (or are likely to influence) policy

[4] For the purposes of this evaluation, future work plans are interpreted as public or industry strategic or investment plans, small and medium enterprise planning, farm level management etc
[5] For the purposes of this evaluation policy is interpreted as public or industry guidance which could be in the form of local, state, or federal government policy, advice that informs the implementation of policy, industry best practice guidelines etc

	Five projects have produced knowledge and information to inform policy and future work programs
Unsatisfactory	Not all projects have influenced (or are likely to influence) future work programs No projects influenced (or are likely to influence) policy Less than five projects have produced knowledge and information to inform policy and future work programs

Note on the rubric

The rubric contains three key elements:

- influence on policy – most difficult to achieve, longest time horizon
- influence on forward work programs – moderately difficult to achieve, moderate time horizon
- production of knowledge and information – simplest to achieve, shortest time horizon.

The level of difficultly and associated time horizons are reflected in the standards of the rubric.

At the time of development of the Overarching Strategy Evaluation Plan, it was identified that five (1, 3, 4, 5, 6) of the seven projects had the potential (or clear evidence of the likelihood of influence) to have a tangible effect on climate and energy policy by the conclusion of the Strategy. While the other two (2 and 7) projects may have such an impact, this was not likely to be observable at the conclusion of the Strategy. The maximum potential policy influence is reflected in the standard of *excellent*.

While moderately difficult, it was anticipated that all projects had the potential to influence forward work prior to the conclusion of the Strategy.

It was a foundational expectation that all projects would produce knowledge and information that had the potential to inform both policy and forward work programs.

The findings against this question have been informed by the evidence collected against the four sub-KEQs of:

- 2 a. Have the projects produced knowledge and information to inform policy and future work programs?
- 2 b. How satisfied are the research users of the knowledge and information that has been produced by the projects?
- 2 c. To what extent have the projects influenced (or are likely to influence) policy?
- 2 d. To what extent have the projects influenced (or are likely to influence) future work programs?

In some cases, it is difficult to categorise the evidence under one sub-question as opposed to another. For readability, evidence against all sub-KEQs has been combined in the section below. While the individual project evaluation reports explain this in a greater level of detail, key examples relevant to the sub-KEQs have been drawn on for the purposes of this report. This approach also satisfies the presence or absence approach of the rubric.

Clean and Energy Efficiency Solutions – Projects 1 and 2

These projects delivered a combination of five face-to-face and seven online workshops titled, “Beyond Diesel”. The face-to-face workshops were held in Bega, Nowra, Buronga, Corowa, and Finley, with 156 attendees in total, and 324 registrations for the webinar series. Overall, there was positive feedback from

both formats. For example, the first Beyond Diesel webinar had 99 online participants and 298 YouTube views, captured feedback from 36 participants, of whom 78% said they strongly agreed that the event was interesting and relevant; 96% either agreed or strongly agreed that the day was useful; and 76% either agreed or strongly agreed that the information was new to them (DOC405). Following the enthusiasm for the webinars, DPI has gone on to trademark the term, “Beyond Diesel”, and continues to re-issue the content generated for these workshops. Through the webinars, the partnership with the NUW Alliance led to the successful bid for the Decarbonisation Innovation Hub (DOC413), with DPI supporting several important feasibility studies during the Strategy’s implementation. One interviewee spoke to the importance of DPI to the NUW alliance partnership noting that DPI has helped to connect the university (UNSW, the lead university in the alliance) with interested parties in the regions. They also noted that DPI has relationships with and an understanding of the regions, as well as critical technical capability related to the Hub’s agreed work program.

> *“DPI was instrumental in informing some of those sort of feasibility studies…you need people to speak the right language, know the right council. That network has been instrumental for us…bringing that local understanding…” (Interviewee)*

The Decarbonisation Innovation Hub is also funding the continuation of the H2Cuts trailer – a mobile, hydrogen powered barber shop which has been a novel method of engaging the public in discussion of alternative energy options. (DOC405).

An interviewee also spoke to the efficiencies that were created due to support provided by DPI:

> *“Having DPI playing that sort of a central role with that regional presence...a lot of that unnecessary expenditure we were able to avoid and give that value for money for whether it’s the government, an overseas investor or domestic companies…it’s been very effective.” (Interviewee)*

Farmers involved with the seven pilot projects have enhanced their knowledge through direct engagement with the technologies being piloted, which will likely have a ripple effect through their networks (DOC405). One project-level interviewee reflected on how the opportunity to participate in the energy pilots (a dollar-for-dollar funding model) was received by participants:

> *“Proportionally, the input from the government for the small pilots was pretty significant. And so... they [*pilot participants*] turned themselves inside out to participate – and they’ve reaped huge rewards.” (I.3) (DOC413)*

Additionally, the knowledge generated through these projects continues to be shared through the Energy Smart Farming Community of Practice - a collaboration between the Victorian, NSW and Federal governments, and Extension Australia and Agrifutures (DOC405).

An example of this is the Energy Efficiency Audit, an online farm focused energy audit course launched in late June 2023, by Tocal Agricultural Institute. The course will step landholders through the process of reviewing and analysing energy use on their farm, including electricity, diesel, gas, and petrol. The desired learning outcome is that participants will be better placed to reduce their costs through a transition to smarter energy choices (DOC405). Furthermore, Tocal Agricultural institute has taken on responsibility for maintaining the "Energy Smart Farming" materials on the Extension Australia website (DOC324).

Biomass for Bioenergy – Project 3

This project established a steering committee with members who were the intended knowledge and information users, including AGL, Australian Renewable Energy Agency (ARENA), Australian Forestry Products Association, and Bioenergy Australia. This ensured the knowledge and information produced by the project responded to their needs. All six of the project-level interviewees indicated the project has substantially progressed knowledge about bioenergy production. The information that has been produced regarding the economic and logistic feasibility of woody bioenergy in various regions and feedstocks is sought after by industry. Interviewees also indicated that they are currently utilising the information generated by the project to plan and develop new bioenergy projects in NSW (DOC406). Four industry interviewees also indicated that they have found information available on the web to be very useful:

> *"The website creates a valuable 'shopfront' that has helped bring industry to the DPI." (DOC406).*

In the bioenergy policy space, NSW is lagging the other states. This is evidenced by the absence of a government department with clear responsibility for biomass policy. One interviewee noted that this was a key barrier to the techno-economic feasibility of biomass (DOC422). The project-level evaluation noted a proposal to establish a new Biomass Unit within DPI Forestry. This unit would provide research and development, extension and policy services, and serve as a first port of call for industry interested in developing biomass projects. This proposal has been submitted for approval, with the Forestry Deputy Director General indicating his support (SSMW, DOC406).

Another DPI Forestry Project Proposal that has been brought about by this project, 'Unlocking the land potential for a sustainable fuels industry in NSW', is currently awaiting approval. Once tenders open, funding from the NSW Decarbonisation Hub will be sought for this project, with the aim of determining the potential for biomass crops to be used as feedstock for sustainable aviation fuel production (DOC406).

Emission Reduction Pathways – Project 4

This project has produced numerous publications and has notably published several articles in the mainstream media, providing an avenue for project insights to enter the public discourse. There have been nearly 300,000 readers of six articles published in *The Conversation* between 2020 and 2022. This is impressive given the challenges associated with ensuring evidence-based information is part of a politically charged discussion.

> *"So, I think that's something this project has done…myth busting type stuff…its giving people confidence about what might work (in terms of reducing emissions) …I think the abatement report is a good start with what's required in NSW." (DOC424)*

There are many instances of Projects 4 and 5 working collaboratively due to their shared theme of 'Carbon Opportunities'. This was not only wise due to shared interests, but also due to their relatively small budgets. The work on what would ultimately become the "*Abatement Opportunities from the Agriculture Sector in NSW*" report was fundamental to informing the design of programs that have now been funded (DOC67), such as the Net Zero Lands program (formerly the Primary Industries Productivity Abatement Plan or PIPAP) (DOC71), and its sub-program, the $5M On Farm Carbon Advice (DOC180).

The importance of the foundational knowledge generated by the project was echoed by all project-level interviewees, with one interviewee highlighting it is a piece of the puzzle essential to informing the next steps in the NSW agriculture sector achieving net zero emissions:

> *"I believe that this project gives a good understanding of the impact of quite a vast range of abatement options to policy makers…it also provides good information on trade-offs and benefits…" (Interviewee)*

The interviewee also spoke about the immediate potential applications of this knowledge to enable better informed discussions within NSW Government, and to inform adjustments to existing Commonwealth policy:

> *"It's given NSW Government and DPI solid evidence to take back to the Commonwealth's Emissions Reduction Fund to make some better decisions." (Interviewee)*

This interviewee highlighted the credibility that the project has brought to DPI, both locally and in the international scene, and how that can continue to open doors and catalyse new collaborations:

> *"I think this piece of research has made DPI shine" (interviewee)*

These contributions at times put significant pressure on the team to continue to deliver on Strategy commitments (DOC67). There is a challenge to be managed between balancing existing work commitments and taking opportunities to achieve further leverage and influence. It also points to a need to consider resourcing requirements and capacity when engaging in new resource intensive cross government collaborations.

Accessing Carbon Markets – Project 5

The project used dedicated forums to disseminate the knowledge generated. DPI held the Carbon Forum and Masterclass in April 2022. This forum was designed to inform farmers about the production benefits or costs of various on-farm carbon management approaches and practical information on accessing carbon markets. The 3-day event was attended by 128 people and the feedback (n=45) captured showed that 20 respondents rated the event very highly (4.3 out of 5 average, where 5 is the highest score possible), and found the content useful (4.2 out of 5). 80% of respondents reported that they learned something new, and 50% said they would implement what they learned (DOC414). One interviewee commented that there is a challenge in disseminating information to users to enable uptake and suggested that there could be a clearer role for steering committee members to support this in future (DOC420).

As discussed under Project 4, project staff have contributed extensively to other projects and policies related to the knowledge and information generated under this project. Again, balancing project responsibilities with the need to capitalise on opportunities to leverage and influence, was a challenge (DOC67). This may also point to a need to consider in-kind time contributions and budgets commensurate with the scope of project ambitions.

Projects and policies the project has contributed to include the Australian Research Council (ARC) Linkage Project targeting greenhouse gas emissions reduction from agriculture (DOC67 DOC414) and the PIPAP being delivered by DPE (DOC71). One project -level interviewee illustrated how the "*Abatement Opportunities from the Agriculture Sector in NSW*" report was foundational to the analysis of what has ultimately become the Net Zero Lands program. This interviewee noted their department's

limited expertise in carbon markets and that DPI's expertise was a key input to the Net Zero Lands program development. Without that input, they would have had to commission a consultant, and in their view, the result would have been costly and a poorer outcome.

As mentioned above, Project 5 catalysed the development of the On-Farm Carbon Advice project which commenced in 2022. This project will build capacity in the agriculture sector to manage carbon as part of the farm business and facilitate opportunities for farmers to participate in new and emerging markets (DOC180).

Vulnerability Assessment – Project 6

The project methodology and preliminary results were presented to other states via the Climate Change Task Group (CCTG) in early 2023 (DOC324). The CCTG is a task group supporting the Agriculture Ministers Meeting. It is hosted by the Commonwealth Department of Agriculture, Forestry and Fisheries who saw the opportunity to potentially optimise efforts and bring about a more standardised approach:

> *"When we first got briefed on the whole project, we saw an opportunity that other States and territories could leverage what NSW has done and use a similar sort of methodology…we want to avoid a situation where states and territories are thinking about ... the same problem in terms of how different industries are going to be impacted by climate change." (interviewee)*

This was met with much enthusiasm by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), as well as other jurisdictions who see an opportunity to leverage the technical approach and lessons learned to inform their work:

> *"So I think the benefit of the NSW project is it's kind of shown ...a bit of a road map and a method for other jurisdictions to follow…and maybe take some thought short cuts as well." (interviewee)*

Within the NSW Government, the release of the project outputs is highly anticipated by key policy makers within central agencies who recognise the information as unique and highly valuable to decision making. This is due to it being both forward-looking and regional in scale.

> *"It's not something we can get from other data sources. It is something specific to NSW and goes down on that granular level that is really needed for big policy decisions in the future…our team just want to get our hands on it and use it" (Interviewee)*

The cross-cutting nature of the work was also identified as a key strength, as there is an increasing need for better coordination and collaboration to ensure more transparent and more consistent information is a shared point of reference for all stakeholders.

> *"And I think from an industry perspective as well…there's lots of congestion around climate change and agriculture…like there's always announcements, programs, there's lots of information being sort of thrust in front of producers, but it's all quite haphazard. It comes from different sources. You don't know which information to trust, so making that task easier by packing both governments and the R&D community work together to simplify the message and make the cost of farmers engaging in this space easier, less overwhelming, is really important because there's lots of activities, no shortage of activity, there's no shortage of money." (interviewee)*

Project 6 has been acknowledged as being foundational to DPI's approach to forward investment decisions and how it will communicate with its stakeholders.

> *"Impossible to overstate the importance of the work that's been done and that will enable informed conversations with communities." (DOC407)*

This importance has been validated by DPI's decision to fund the extension of the project for a further two years. It is apparent that the project has influenced the content of the *DPI 2022-2030 Strategic Plan*, with the project insights cutting across several strategic priorities such as "Quantify vulnerability and opportunities to climate change and support adaptation" and "Lead the preparation for and prevention of future biosecurity threats" (DOC423).

The next iteration of the project has been informed by the ways in which the insights generated are already being applied and have the potential to be applied. For example, the impacts of climate change are quite immediate for some horticultural commodities, and rapid industry response is required. This understanding has informed further research into potential responses (DOC411). The modelling approach will be applied to assessing the impact of adaptations on 12 further commodities. The Multi Criteria Analysis (MCA) methodology developed by the project has also been identified as having further application for supporting biosecurity responses. As a result, the MCA methodology will be applied to a further 25 biosecurity risks (DOC407).

While the findings generated under the project still need to be refined and targeted to the specific industry sectors, there has been strong engagement and enthusiasm, and they are anticipating the results (DOC407).

Climate Smart Pilots – Project 7

This project has taken a highly applied approach, which has left a positive legacy in both the public and private sectors and across numerous industries. One of the pilots undertaken is the Clyde River Estuary Sensor Platform, which established a network of sensors to provide oyster farmers with better water quality and climate related information to inform their operations.

This pilot was undertaken in partnership with the Eurobodalla Shire Council who have since continued to support the LoRaWAN network which the DPI sensor network relies upon. The NSW DPI continue to provide real-time data on water salinity and temperature - key determinants for oyster growth and health to help growers better manage their crops. The NSW DPI dashboard is being expanded to support other estuaries in NSW where such sensors have been installed by LLS. The NSW Food Authority and Food Agility - a Commonwealth funded cooperative research centre with partners spanning the agrifood technology, government and research sectors - adopted the sensor model developed by NSW DPI to support research into harvest closure of the oyster fisheries.

Project 7 Pilots are informing existing work programs and have acted as the catalyst for others. The Commonwealth Future Drought Fund has allocated $180,000 to support the continuation of Irrigation Masterclasses, enabling the P7 team to support a greater diversity of growers in the horticulture sector (DOC413). Within the NSW Government, the knowledge generated through the project is now being built on to assist in identifying adaptation options for selected commodities as part of the extended Vulnerability Assessment (DOC408), as well as informing the Department of Regional NSW's animal welfare research and project operations (DOC408). Importantly, the project has also identified areas of work that should not be further pursued (DOC405).

The device management app developed as part of the project has now had over 300 downloads, and several private sector organisations servicing the primary industries sector have utilised the IP created and made freely available by the project in the commercialisation of their products (DOC408).

The Climate Smart Pilots project has done an exemplary job of communicating the stories of people who have engaged with the pilots. Nineteen *Climate Smart Farmer Stories* have been published, which link to an interactive map of the state and include short video stories. Two of those stories have been completed in partnership with Soils for Life (DOC324). These stories demonstrate participants' satisfaction with the knowledge and information produced through the project.

The knowledge generated by the project will continue to be shared through the Digital Agriculture National Community of Practice, which has participants across the Commonwealth, Victoria, Queensland, South Australia and NSW (DOC413).

KEQ3. How did the Strategy contribute to DPI Strategic Outcomes?

Finding

The PICCRS contributed to all but one of the DPI Strategic Outcomes from the 2019-23 Plan and was influential in the development of the new Carbon Neutrality and Climate Resilience Strategic Outcome under the 2022-2030 Plan.

The DPI 2019-2023 Strategic Plan was current at the time of planning the Strategy. Each project used an 'authorisation pathway' to map the strategic plan outcomes to which they would contribute. The mapping was as follows:

- Maximise connection with communities, industries and people 3/7 (projects 1, 2, 3)
- Increase productivity and profitability of plant and livestock systems 6/7 (projects 1, 2, 3, 4, 5, 7)
- Enhance the productive and sustainable use of agricultural resources 6/7 (projects 1, 2, 3, 4, 5, 6)
- Protect and promote NSW biosecurity 0/7
- Manage sustainability of forestry and hunting 1/7 (project 3)
- Protect and enhance aquatic resources and environment 1/7 (7)

The findings against KEQ2 provide tangible examples of how projects have contributed to the mapped outcomes. Based on those findings, it could be argued that some projects have contributed to outcomes they did not intend to.

For example, the Vulnerability Assessment (Project 6) has generated insights that will inform forestry management in the future. The Climate Smart Pilots (Project 7) project has engaged whole industry sectors in communities and fostered connections between those industries and local government.

Possibly more importantly, the Strategy appears to have had a tangible impact on DPI's current strategic direction. The process to update the DPI Strategic Plan commenced in August 2021 and has 6 strategic outcomes. The plan features "Carbon Neutrality and Climate Resilience" as a new strategic focus recognising the overarching impact of climate change on primary industries (DOC137, DOC413). DPI's commitment to a further two years of funding for the Vulnerability Assessment has been reported to be foundational to the organisation's approach to forward investment decisions (DOC407).

> *"It's definitely been of great strategic importance for us. It's helped us with answers to some pretty important questions that we're trying to grapple with and given us more direction than what we would have had otherwise in some very key areas." (SSMW)*

Energy also features in the new Strategic Plan. Sensemaking workshop participants reflected that the energy projects under the Strategy had helped to articulate the clear future role for DPI in this space.

> *"I think without the energy projects, we wouldn't really have much of a base to argue for new energy projects at all. I don't think DPI would have been playing much in this space into the future…the energy projects have been fairly instrumental in identifying that DPI has a role here…" (SSMW)*

KEQ4. How did the Strategy contribute to CCF purposes?

Finding

The Strategy contributed to the CCF purposes by raising awareness and providing information for primary industries and government on:

- managing energy demand to reduce greenhouse gas emissions
- alternate renewable supply options to reduce greenhouse gas emissions,
- where investment should be focused to address future climate change impacts

The PICCRS generated a lot of awareness and evidence relevant to climate change adaptation, mitigation, and sequestration actions that do not correspond closely with the CCF Objectives. This demonstrates that the objectives of the Fund, set out in 2005, do not reflect a contemporary understanding of climate change issues and required action.

Each project used an 'authorisation pathway' to map the CCF purposes to which it would contribute. The mapping was as follows:

- Reduce GHG emissions and climate change impact associated with water and energy 4/7 (projects 1, 3, 4, 5)
- Encourage energy and water savings/recycling 1/7 (project 2)
- Reduce demand for water and energy 1/7 (project 1)
- Stimulate investment in innovative energy and water savings 2/7 (projects 1, 2)
- Increase public awareness and acceptance of the importance of climate change and water and energy savings measures 4/7 (projects 2, 4, 6, 7)
- Provide funding for contributions made by the State for the purposes of national energy regulation 0/7

While there are tangible examples of how projects have contributed to the CCF objectives (see KEQ 3), the projects have delivered extensive and relevant contributions regarding climate change adaptation, mitigation, and sequestration action available to primary industries and government that go beyond the CCF objectives.

This is due to both the CCF enabling legislation, and the era in which the objectives were developed. The CCF is generated from a levy on the NSW energy consumer and thus there is a justifiable

emphasise on energy in the objectives. Further, the purposes were established in 2005 when Australia was in the grips of the Millenium Drought and our understanding of action required to stop climate change was limited. Little review or updating has been done since.

Since that time, there has been much focus and investment in developing a better understanding of the drivers and implications of climate change.. There is also significant research around adaptation, mitigation and sequestration responses, and the establishment and expansion of carbon markets. Public and private investment these areas will continue to be relevant for the foreseeable future. This raises the case for the CCF purposes being updated to reflect the contemporary understanding and focus of climate change action.

4. RECOMMENDATIONS

That DPI continue efforts to address the organisational systems and processes that are impeding efficient project management.

It is understood that various actions are underway to address some of the organisational systems and processes impeding best practice project management. DPI has commenced a “Best Practice Project Management Program” to improve project management approaches. Successfully addressing these barriers will be critical to the success of future portfolios of work, particularly those that require a matrix approach to delivery. Ideally, any project management system solution adopted should include project scheduling capability and the ability to allocate hours against resources to provide visibility on staff capacity. Action to resolve the financial management systems should be a high priority.

That DPI prioritises delivering large portfolios of work that will bring critical mass and expertise, reduce fragmentation, and more clearly establish its value proposition. This is consistent with the DPI Strategic Plan that indicates stakeholders are supportive of bigger bolder investments.

The climate change adaptation and mitigation space is crowded with many players and streams of funding. This contributes to disjointed and inefficient efforts by many stakeholders with shared interests. Prioritising large portfolios of work has multiple benefits, including larger amounts of funding which create project management efficiencies, the potential to have embedded support staff, greater presence with and influence over other organisations and agencies, and opportunities to consolidate and coordinate efforts, the latter being an important role of government. This approach was something that stakeholders expressed a desire for during consultations to inform the updated DPI Strategic Plan.

That DPI places greater emphasis on resource planning including having dedicated coordination staff, supporting, and encouraging project managers to properly cost all facets of project management and governance. Greater upfront investment to plan the resource needs of portfolios and projects is essential to successful delivery. Having a dedicated coordinator has been critical to the success of the Strategy and should be a standard inclusion in proposals for similar sized portfolios in the future. Resource requirements for effective project delivery such as finance, media, and science communications, legal and contracts, evaluation, and governance support also needs to be planned and included in portfolio level proposals. Subsequently, project leads should be supported to map out their requirements at the project level.

There are a range of models, that can be employed to provide non-core project services, and consideration should be given to which model, or combination of, should be used to ensure the right support is available to projects at the right time. The two main models that should be considered include:

- Option 1: Dedicated embedded staff. This option creates a high-level buy-in and eliminates the risk of resources being diverted to other priorities. This has worked well in the Strategy with the Strategy Coordinator being the obvious example.
- Option 2: Matrix model. This is desirable as it encourages integration and collaboration across the organisation. This has had mixed success in the Strategy, working relatively well with finance and evaluation support (albeit disrupted by staff turnover), compared to legal and communications.

The future success of a matrix model approach would likely be improved simply through a more detailed planning process. Where possible, this should be done in collaboration with those services. Where necessary, commitments could be strengthened through formalised agreements such as memorandums of understanding.

Project leaders should also have access to governance training and advice to help project teams establish fit-for-purpose arrangements. This may be provided internally or externally.

Regardless of the option/s adopted, user friendly project management systems that enable resource scheduling will be a key success factor, emphasising the importance of the first recommendation.

> That DPI builds on the measurement, evaluation and reporting (MER) exemplar delivered by this Strategy, including using it to support regular reviews, and identifying and applying lessons learned.

A MER project of this scale is the first of its kind in NSW DPI. While it has not always been a smooth path, the evaluation capability uplift has been significant. DPI is still in the early stages of its MER journey; however, this project is an exemplar and should be built upon. Initial steps should include promoting the use of the recently updated NSW Treasury Evaluation Policy and Guidelines, encouraging the development of program logics as standardised project design practice, articulating performance expectations using rubrics or similar tools, and using data capture tools such as impact logs to reduce data capture and management burdens on project teams and as a useful means for tracking systems change.

There is also the potential to use MER activities to support continuous improvement of projects more actively. This could include annual reflection workshops for teams to collaboratively review and update their program logics, reflect on measurement data to understand what is working, what isn't and what changes should be made. Such approaches would help integrate MER into the project management cycle and build the evaluation capability of staff as they gain experience applying MER concepts to improve their project management.

> That DPI maintains and evolves a high-level governance group to support collaboration and good governance in relation to climate change, adaptation, and mitigation, as exhibited by the PICCRS Governance Group.

This evaluation has found that the Governance Group added value to the delivery of the Strategy by aiding communication and collaboration across the different branches of DPI. The need for the group, or something similar, moving forward has already been identified. The Governance Group should consider the current and future portfolios of work, the implementation of its current strategic plan, and consider how the terms of reference could be reviewed to provide support and add value.

> That DPI continues efforts to share the knowledge and insights generated by the Strategy.

This evaluation has found that the knowledge and information produced by the Strategy has been highly valued by the stakeholders it has engaged with to date, though the ripple effect of the knowledge and information generated will continue beyond its conclusion. The extent of the Strategy's impact will be enhanced by continuing to disseminate the insights to maximise the chance of adoption through its ongoing involvement in forums such as the Renewables in Agriculture Conference, and the Climate Change Task Group.

5. APPENDIX 1 DOCUMENT REGISTER

Document reference number	File name
32	1 page brief for TOR.docx
33	20220222 Climate comms and social.pdf
34	ag comms team.PNG
53	Budget vs actuals.jpg
54	CCRS Actuals by Project June 7th Finalpdf.pdf
61	CCRS Financial Report 31.12.21 - Final version.xlsx
64	CCRS Financial Report_10052022.xlsx
67	CCRS Governance Group_Draft Minutes_Meeting 7_04122020jc.docx
68	CCRS Mid-term Evaluation presentation (003).pptx
69	CCRS Working Group Placeholder_2-20220524_133832-Meeting Recording.mp4
70	CCRS Working Group_Draft Actions_05082021.docx
71	CCRS Working Group_Final Actions_10122020.docx
73	CCRS Working Group_MER_Reporting_presentation.pptx
82	Conflict of Interest Register_31082021.docx
86	Copy of CCRS Budget vs Actuals 22 March 2023.xlsx
119	DPI PI CC Governance Group Actions from Meeting.docx
136	Draft Minutes_Meeting 10_PICCRS_Governance Group_20220915.docx
137	Draft Minutes_Meeting 8_PICCRS_Governance Group_31082021.docx
148	FINAL_ALL CCRS Projects STAFF HOURS_as of 4.11.2019.pdf
150	Final_CCRS Budget vs Actual Report - december 2021.xlsx
151	FINAL_COMBINED CCRS Projects_BUDGET vs ACTUAL_as of 4.11.2019.pdf
157	Governance Group Key Findings 09122020.docx
161	Item 2 Governance Group rolling actions.pdf
163	ITEM 2_Agenda Paper_PI CCRS Governance Group Actions from Meeting 5_20200528.docx
165	ITEM 2_Agenda Paper_PI CCRS Governance Group Actions from Meeting 6_20201201.pdf
166	ITEM 2_Attachment 2A_CCRS Observations_20200528.docx
170	ITEM 2_Attachment 2C Conflict of Interest Register_20220310.docx
172	ITEM 2_Attachment 2C_Draft Conflict of Interest Register_20200528.docx
174	ITEM 2_ATTACHMENT_Combined Conflict forms.pdf
177	Item 2_DPI PI CC Governance Group Actions from Meeting 4.pdf
180	ITEM 2_Minutes_Meeting 9_PICCRS_Governance Group_20220322.docx
182	ITEM 2A_Meeting 10_Action Table_20220915.docx

184	ITEM 2A_Meeting 11_Action Table_20230511.docx
185	ITEM 2A_Meeting 7_Action Table_31082021.docx
188	ITEM 2A_Meeting 9_Action Table_21-222.docx
197	Item 3_Agenda Paper_CCRS Progress and Financial Report_20201201.pdf
201	Item 3_Agenda Paper_Revised Terms of Reference for GG and WG.docx
243	ITEM 4_Agenda Paper_Project Risk.docx
245	ITEM 4_Agenda Paper_Project Risk_20200112.docx
248	ITEM 4_Agenda Paper_Project Risk_20220310.pdf
249	ITEM 4_Agenda Paper_Project Risk_20220915.docx
251	ITEM 4_Agenda Paper_Project Risk_20230511.docx
252	ITEM 4_Attachment 4A Project Progress Report.docx
255	Item 5 BN18 8350_Climate Change Research Strategy status update to Minister Blair.pdf
260	ITEM 5_Agenda Paper_CCRS Communications Update_20200112.docx
263	ITEM 5_Agenda Paper_CCRS Communications Update_20220310.docx
264	ITEM 5_Agenda Paper_CCRS Communications Update_20220511.docx
265	ITEM 5_Agenda Paper_CCRS Communications Update_20220915.docx
267	ITEM 5_Agenda Paper_CCRS Communications Update_31082021.docx
269	ITEM 5_Agenda Paper_Project Risk_20200528.docx
275	ITEM 5A_DPI Climate Conference Report.docx
282	ITEM 6_Agenda Paper_CCRS Communications Plan_20200528.docx
284	ITEM 6_Agenda Paper_CCRS Monitoring, Evaluation and Reporting Update_20220511.docx
287	ITEM 6_Attachment 6A_CCRS Comms Plan_20200528.docx
317	Item_PICCRS Lessons Learnt.pdf
324	Meeting 21 Minutes 20230328.docx
329	Minutes_Meeting 10_PICCRS_Governance Group_20220915.docx
336	New Financial Report_20201215.xlsx
376	PICCRS Working Group ToR Draft Agreed update.docx
405	Projects 1 and 2 Evidence Table
406	Project 3 Evidence Table
407	Project 6 Evidence Table
408	Project 7 Evidence Table
409	V3 DRAFT P1 and 2 Report -CEESP Version for Beth
410	V6.0 DRAFT Climate Smart Pilots Draft Report
411	V2 DRAFT P-6 Report -Vulnerability Assignment comments collated 21 April
412	DPI Climate Conference Feedback Summary_Version2
413	Questions from Beth
414	Project 5 Expanded Results
415	Interview questions for Stakeholders

416	Researcher Interview
417	Farmer Interview
418	Policy Interview
419	Investor Interview
420	P5 Interview transcript 1
421	P5 Interview transcript 2
421	P3 Interview transcript
422	CCRS Mid Term Process Evaluation Report
423	DPI Strategic Plan 2022-A33:B4252030
424	Project 4 Evidence Table
425	CCRS Mid-term Evaluation Report
426	BN20 3831 DDG Brief - Approval for CCRS Mid-term Process Evaluation Report distribution
427	Item 2 Outcomes of PI CCRS Workshop

6. APPENDIX 2 RUBRIC FOR KEQ 2

Standard	Description
Excellent	As good, plus: Five projects have influenced (or are likely to influence) policy
Good	As adequate, plus: Three or four projects have influenced (or are likely to influence) policy
Adequate	All projects have influenced (or are likely to influence) future work programs One or two projects influenced (or are likely to influence) policy Five projects have produced knowledge and information to inform policy and future work programs
Unsatisfactory	Not all projects have influenced (or are likely to influence) future work programs No projects influenced (or are likely to influence) policy Less than five projects have produced knowledge and information to inform policy and future work programs

7. APPENDIX 3 SUMMARY OF KNOWLEDGE AND INFORMATION PRODUCED BY PROJECTS

Projects 1 and 2

Project #	Document type	Produced by	Title
1 and 2	Report	A2EP	“Exploring the potential for primary industries to improve energy productivity”
	Report	Cutler Mertz	“Energy infrastructure for future farming”
	Report	Mov3ment	‘Diesel use in NSW agriculture’
	Report	Collaboration between DPI and NSW Farmers	“Agricultural Renewable Energy Acceleration Initiative”
	Community of Practice site	Project team	Energy Smart Farming - https://extensionaus.com.au/energysmartfarming/home
	Webinars	Project team	Beyond Diesel Webinars - https://www.tocal.nsw.edu.au/courses/short-courses/business-management/exploring-beyond-diesel
	Presentations	Project team	Farm Energy Forums – Bega, Nowra, Corowa, Finley, Buronga - link
	Feasibility studies	Project team	Feasibility studies for each of the case studies considered for pilots – link.
3	Published papers	Project lead in collaboration	'The roles of biomass and CSP in a 100 % renewable electricity supply in Australia' (2020) https://www.sciencedirect.com/science/article/pii/S0961953420303378 'Hybrid concentrated solar biomass (HCSB) plant for electricity generation in Australia: Design and evaluation of techno-economic and environmental performance' (2021) https://www.sciencedirect.com/science/article/abs/pii/S0196890421004209 'Assessing electricity generation potential and identifying possible locations for siting hybrid concentrated solar biomass (HCSB) plants in New South Wales (NSW), Australia' (2022) https://www.sciencedirect.com/science/article/abs/pii/S0306261921012526 'Scenario modelling of biomass usage in the Australian electricity grid' (2022) https://www.sciencedirect.com/science/article/abs/pii/S0921344922000465

			'Hybrid concentrated solar biomass (HCSB) systems for cogeneration: Techno-economic analysis for beef abattoirs in New South Wales, Australia' (2022) https://www.sciencedirect.com/science/article/abs/pii/S0196890422004162 'Bioenergy siting for low-carbon electricity supply in Australia' (2022) https://www.sciencedirect.com/science/article/pii/S0961953422001581
	Website materials	Project team	Biomass Crop Trials – Information and Fact Sheets - link
	Presentations	Project lead	2020 – Zero Waste in Primary Industries – DPI 2050 Spark Forum 2019 – Is it Feasible to use biomass in NSW for grid-scale electricity generation? - Bioenergy Australia STRONG Conference 2019 – Opportunities and challenges for increased use of biomass for bioenergy in NSW 2018 – Biomass in the Hunter – Prospects and Possibilities – BioValley Forum
4	Published Papers	Project lead	Opportunities for sequestration and emissions reduction from the NSW agriculture sector (2020) ("the Abatement Report") Co-benefits and trade-offs of climate change mitigation actions and the Sustainable Development Goals (2021) How biochar works, and when it doesn't: A review of mechanisms controlling soil and plant responses to biochar (2021) Future climate impacts on forest growth and implications for carbon sequestration through reforestation in southeast Australia (2022) Modelling and mapping soil organic carbon stocks under future climate change in south-eastern Australia.Climate change mitigation potential of summer cowpea cover crops in Southern Australian cropping systems is limited (2022) Identifying effective agricultural management practices for climate change adaptation and mitigation: A win-win strategy in South-Eastern Australia (2022)
	Online articles	Project lead	The Conversation - https://theconversation.com/au "IPCC says the tools to stop catastrophic climate change are in our hands. Here's how to use them". (2022) "Environment footprint calculators have one big flaw we need to talk about" (2022) "US scheme used by Australian farmers reveals the dangers of trading soil carbon to tackle climate change" (2021) "The Morrison Government wants to suck Co2 out of the atmosphere. Here are 7 ways to do it". (2020).
5	Published papers	Project lead	Baumber, A.,Cross,R.,Waters,C.,Metternicht,G.,Kam,H. (2022). Understanding the Social Licence of Carbon Farming in the Australian Rangelands, Sustainability, 14(1), 174; https://doi.org/10.3390/su14010174

			Baumber, A., Metternicht, G., Cross, R., Ruoso, L.E., Cowie, A.L. & Waters, C. (2019). Promoting co-benefits of carbon farming in Oceania: Applying and adapting approaches and metrics from existing marketbased schemes, Ecosystem Services, 39:100982, https://doi.org/10.1016/j.ecoser.2019.100982 Baumber, A, Waters, C., Cross, R., Metternicht, G., Simpson, M (2020) Carbon farming for resilient rangelands: People, paddocks and policy. The Rangeland Journal https://doi.org/10.1071/rj20034 Cross, R., Metternicht, G., Baumber, A., Waters, C, Kam, H., 2019, Improving access to carbon farming market access: Stakeholder needs analysis https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0020/1316144/Brief4_Banner4_combined.pdf Gray JM, Wang B, Waters CM, Orgill SE, Cowie AL, Ng EL (2021) Digital mapping of soil carbon sequestration potential with enhanced vegetation cover over New South Wales, Australia. Soil Use and Management. https://doi.org/10.1111/sum.12766 Metternicht, G., Waters, C., Baumber, A., Cross, R., 2019, Evaluation of potential indicators for the co-benefits of carbon farming in NSW. https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0018/1316142/Brief3_and_3-with_book_banner.pdf Wang, B., Waters, C., Anwar, M.R., Cowie, A., Liu, D.L., Summers, D., Paul, K., Feng, P. (2022). Future climate impacts on forest growth and implications for carbon sequestration through reforestation in southeast Australia. Journal of Environmental Management 302: 113964, https://doi.org/10.1016/j.jenvman.2021.113964 Wang, B., Gray, J.M., Waters C.M., Anwar, M.R., Orgill, S.E., Cowie, A.L., Feng, P., Liu, D.L. (2022). Modelling and mapping soil organic carbon stocks under future climate change in southeastern Australia. Geoderma, 405 115442, https://doi.org/10.1016/j.geoderma.2021.115442 Waters C., Cowie, A., Wang, B., Simpson, M., Gray, J., Simmons, A and Stephens, S (2020). Abatement opportunities from the agricultural sector in New South Wales: Modelling to support the development of the Primary Industries Productivity and Abatement Program NSW Department of Primary Industries. ISBN: 978-1-76058-415-3 https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/1314564/NSW-Carbon-emissions-brochure-Final.pdf Waters, C.M., McDonald, S., Reseigh, J., Burnside, D., Grant, R. (2020) Insights on the relationship between total grazing pressure management and sustainable land management: key indicators to verify impacts The Rangeland Journal 41(6):535 https://doi.org/10.1071/RJ19078
	Website materials	Project team	“Understanding carbon farming opportunities”
6	Website materials	Project team	Fact Sheet - “Understanding climate risks and opportunities for primary industries”

			Details of 28 Commodities - https://www.dpi.nsw.gov.au/dpi/climate/climate-change-and-primary-industries/explore-by-industry Details of Biosecurity Risks - https://www.dpi.nsw.gov.au/dpi/climate/climate-change-and-primary-industries/biosecurity-risks Details of Engagement - https://www.dpi.nsw.gov.au/dpi/climate/climate-change-and-primary-industries/resources
7	Website materials	Project team	Digital Agriculture Research – Fact sheets, tiles and online articles - https://www.dpi.nsw.gov.au/dpi/climate/digital-agriculture/digital-agriculture-research2 OnFarm AgTech Demonstration Sites - https://www.dpi.nsw.gov.au/dpi/climate/digital-agriculture/pilots-map
	Video case studies	Project team	Farmer stories - https://www.dpi.nsw.gov.au/dpi/climate/digital-agriculture/farmer-stories
	Published papers	Project lead	**Bates, H., Pierce, M., Benter, A.** (2021). Real-Time Environmental Monitoring for Aquaculture Using a LoRaWAN-Based IoT Sensor Network. *Sensors* 21, no. 23: 7963, https://doi.org/10.3390/s21237963 Bates, H., Pottie, D., Taylor, D., Benter, A. (2022). Automatic multi-weigh-station for assessing sheep liveweight in small flocks. Computers and Electronics in Agriculture https://doi.org/10.1016/j.compag.2023.107631