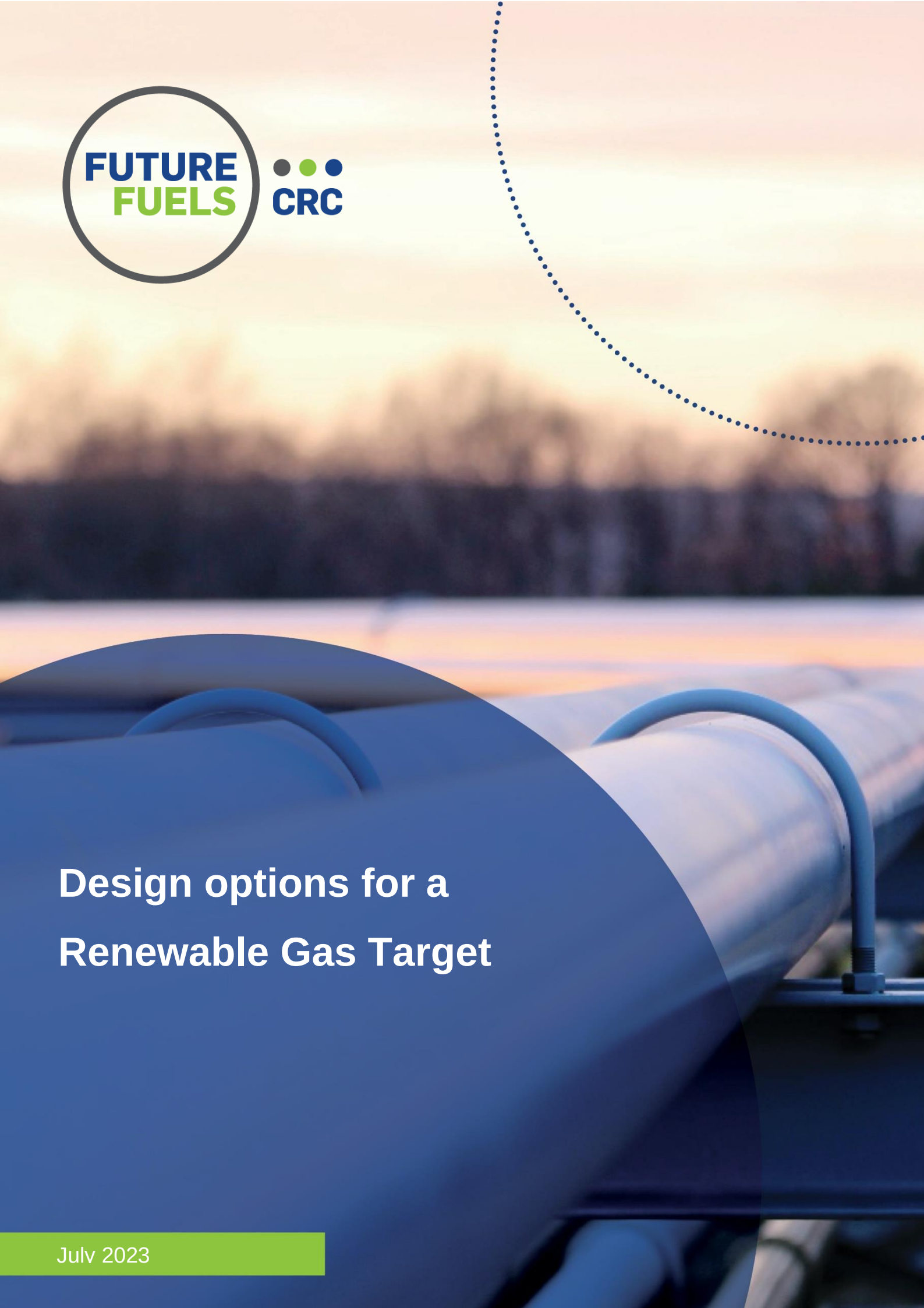

Design options for a Renewable Gas Target

July 2023

Project number: RP 2.2-04

Policy options to support future fuels deployment

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PROJECT INFORMATION	
Project number	RP 2.2-04
Project title	Policy options to support future fuels deployment
Research Program	Research Programs 1 and 2
Milestone Report Number	Supply of RGT options consultation report
Description	This project is designed to allow stakeholders to better assess the implications of policy options for a national Renewable Gas Target (RGT) and their implications for the broader adoption of future fuels. It considers alternative approaches to the design and implementation of a national RGT, their implications for Australia's future fuels mix and their implications for economic outcomes in the Australian States and Territories. Furthermore, this project will enhance stakeholder confidence with respect to potential policy and regulatory frameworks and their impacts on the sequence of events and investments necessary to ensure success and manage risks. This project will develop a broader understanding of the implications of RGT mechanisms for future fuels. It will explore a number of aspects of the design of an RGT to inform stakeholders on the likely outcomes of alternative RGT policies for the future fuels sector and the broader economy. The details of the policy scenarios will be discussed and agreed with the reference group, as will an appropriate baseline scenario which may relate to a policy "do nothing" scenario or a more concerted economywide intervention such as a carbon price.
Research Provider	The University of Adelaide
Project Leader and Team	Lead: A/Professor Jim Hancock, University of Adelaide Ms Suraya Abdul Halim, University of Adelaide Dr John Kandulu, University of Adelaide Mr Anthony Kosturjak, University of Adelaide Dr Laurence Lester, University of Adelaide Dr Virginie Masson, University of Adelaide A/Professor Liam Wagner, University of Adelaide
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Related Commonwealth Schedule	RP1.1.3 Report on future fuels for decarbonisation of industrial, residential (heat), electricity, and other sectors delivered. RP2.2.2 Report on best practice policy solution to support successful adoption of future fuels delivered to industry, community and government stakeholders. RP2.2.3 Situation analysis and policy briefing documents for policy-makers and other key future fuels stakeholders delivered.
Project start/completion date	April 2022/July 2023
IP Status	**Open** – available publicly to all parties outside the CRC
Approved by	Dennis Van Puyvelde
Date of approval	24 July 2023

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Executive Summary

This report considers the design of a renewable gas target (RGT) to develop Australia's renewable gas sector. It also sets out a number of design configurations for an RGT which is modelled on Australia's Renewable Energy Target.

A renewable gas target sets an objective for the evolution of renewable gas in the energy supply and it establishes a mechanism to pursue that objective. There are a number of issues that need to be addressed in the design of an RGT including:

- Which gases should be eligible?
- What should be the basis for crediting gases?
- Which uses of renewable gas should be eligible?
- Should there be segmentation? (i.e. specific targets for specific gases or specific gas uses)
- Who should meet the costs?
- Should targets be set in terms of quantities or prices?
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- Should there be discrimination over the geographic source and use of renewable gas?
- Should there be a uniform national or separate State schemes?
- What ambition should an RGT have in terms of renewable gas take-up?
- Should concessions be granted to any parties affected by the scheme?
- How should the RGT interact with other schemes (e.g. Safeguard)?
- What would be the terms of opt-out from the scheme?

We held discussions with both industry partners and government officials to identify their perspectives on an RGT. Numerous themes emerged from those discussions.

There is universal agreement that renewable gas has an important role to play in the future Australian energy mix, but there is considerable uncertainty about how large that role is.

There is a tension between leaving markets to resolve which renewable fuels are provided to who and when ("technology neutrality") and taking a more targeted policy position that seeks to foster particular renewable gas supply chains while they develop.

The question of who should pay for renewable gas development is not straightforward. The "beneficiary pays" principle may have considerable appeal, but this raises the question of who the beneficiaries are. It is superficially appealing to say that gas consumers are the beneficiaries, but this overlooks that electrification also has impacts on electricity users, and that the beneficiaries of renewable gas development are future users of gas, not current users. It might therefore be more appropriate to identify a least-distorting allocation of costs, such as across all stationary energy users or broad-based efficient taxes.

The development of renewable gas production and use is seen by the States as an important part of their individual economic development strategies.

We present nine options for an RGT. They are just a handful of the countless configurations that could be set out and we acknowledge that there may be other configurations that have appeal. The options presented illustrate different degrees of intervention in the fuel mix and different approaches to allocating costs. They all share the following features, which were either generally agreed or regarded to be of secondary importance and able to be left to a more detailed design stage:

- renewable gas producers generate RGCs based on energy content;

- retailers/large users must surrender RGCs in line with energy content of their sales/use;
- voluntary surrenders permitted;
- quantitative target based on renewable gas energy content;
- national scheme;
- neutral as to source of renewable gas;
- no concessions specified; and
- integration with Safeguard Mechanism and alignment with Guarantee of Origin.

All but one of the options specified use a bilateral transactions model, in which liable parties purchase RGCs from eligible producers and then surrender them to extinguish liability. Each of these eligibility/liability/target configurations could also be implemented using a pooled arrangement (see the Deep Dive report for more details). One option involves a pooled arrangement with government providing funds to cover the costs of the pool (essentially the model used with the Emissions Reductions Fund).

The options presented here all involve a national scheme. It would be important for a national scheme to leave appropriate flexibility to the States in pursuing their own economic development agendas. (The Renewable Energy Target in the electricity target operates in this way – it takes a location neutral approach but States have intervened in the development of renewable electricity in their own jurisdictions.)

Five of the options involve segmented targets—separate targets for green hydrogen and renewable methane and, in one instance, targets by use. This approach is at odds with the principle of technology neutrality but might be justified if there are sufficiently large market failures that impede the developments of supply chains for these fuels. The nine options are (with further details in the body of the report):

Option A is neutral across all carbon net-zero gas types, thus it admits blue hydrogen with full CCS and hydrogen from nuclear. It excludes exports and transport use but otherwise is neutral with respect to use of the gas. It sets target renewable gas proportions out to 2050, in which year it reaches a 100 per cent renewable gas requirement (i.e. natural gas is fully displaced). The implicit costs of the renewable gas subsidies are met mainly by all domestic gas consumers.

Option B is the same as Option A except that it restricts eligibility to renewable gases. It is neutral across renewable gas types. It excludes exports and transport use but otherwise is neutral with respect to use of the gas. It sets target renewable gas proportions out to 2050, in which year it reaches a 100 per cent renewable gas requirement (i.e. natural gas is fully displaced). The implicit costs of the renewable gas subsidies are met mainly by all domestic gas consumers.

Option C is the same as Option B except that it sets a target only until 2035, when a 20 per cent renewable gas fraction is required. This RGT is focused more on development of renewable gas supply chains, and comes to an end when a degree of maturity is reached at 20 per cent of total gas.

Option D is similar to Option C, except that it segments the renewable gas types, and targets green hydrogen and renewable methane separately. The rationale for this option is that an untargeted scheme may see all of the renewable gas growth take place with biomethane. In this case the scheme might not provide effective support to progress green hydrogen to scale. The scheme sets earlier targets for renewable methane in recognition of this. It is likely that the renewable methane target would be met by biomethane, but other forms such as synthetic methane qualify too.

Option E is similar to Option D, except that in this case electricity users also contribute to the costs of the scheme, in addition to domestic gas users. The rationale for this option is that the gas and electricity systems are integrated and they may become further integrated in the future. Measures that reduce the need to expand the electricity system, such as the development of renewable gas, benefit electricity consumers as well as gas consumers. In addition, renewable gas has an important role to play in firming the electricity system. RGC surrender rates are set separately for liable gas and electricity entities to achieve a desired cost sharing outcome.

Option F is similar to Option E, except that in this case it extends to transport. Transport use of renewable gas (including the manufacture of transport fuels from renewable gas) is a permitted use under this version of an RGT. In addition to gas and electricity retailers and large users, wholesalers of petroleum are liable to surrender

RGCs and pass the associated costs on to consumers of petroleum. RGC surrender rates are set separately for liable gas, electricity and petroleum entities to achieve a desired cost sharing outcome. Although support wasn't expressed for extending an RGT to transport (at a project workshop noted in Chapter 3 of this report), this option has been included because renewable gases—for example green hydrogen and derivative fuels—have potential applications in transport.

Option G is similar to Option D, except that in this case exports of gas are included in the scheme. On top of the domestic green hydrogen and renewable methane targets in Option D, targets are also set for export green hydrogen. And the obligation to surrender RGCs is now extended to gas exporters on the basis of energy content. Although support wasn't expressed for extending an RGT to gas exports (at a project workshop noted in Chapter 3 of this report), it is included because overseas customers may over time seek to replace natural gas and coal with renewable gas, and the establishment of a renewable gas capability would allow Australia's gas export industry to participate in the new market opportunities arising. Australia's gas exports are much greater than domestic consumption, and this option would see exporters meeting a substantial part of the costs of the RGT.

Option H is similar to Option G, except that in this case separate targets are applied by use for generation, hubs, network customers and exports.

Option I is similar to Option C, except that it employs a pooled funding model and is funded directly by government from the budget. The rationale for this option is that by accessing funds from central government the costs are spread broadly, without distortions to existing patterns of energy use, and the funds come from efficient broad-based taxes.

1. Introduction

This report considers the design of a renewable gas target (RGT) to develop Australia's renewable gas sector. A renewable gas target sets an objective for the evolution of renewable gas in the energy supply and it establishes a mechanism to pursue that objective.

During 2022 and 2023 the University of Adelaide has been carrying out a research project for the Future Fuels CRC that investigates policy options to support future fuels deployment. A project report *Understanding the implications of a Renewable Gas Target for Australia's gas networks: Deep Dive Report* was published earlier this year. That report drew on an in-depth survey of renewable target schemes around the world and stakeholder consultations to identify key design criteria for an RGT and to set out preliminary options for an RGT.

The *Deep Dive Report* contained an RGT design modelled on the Renewable Energy Target which operates in the Australian electricity sector. After the release of the *Deep Dive,* a workshop was held in Adelaide with industry partners to discuss further options for an RGT and consultations were held with Australian and State Government agencies. We are grateful for the insights given to us by all who were involved.

This report presents a number of options for an RGT. These options are just a handful among the countless configurations that could be set out. The selection is motivated by the goal to identify options that develop the role of renewable gas in the Australian energy system. The options presented illustrate different degrees of intervention in the fuel mix and different approaches to allocating costs.

The paper has three main sections. Section 2 discusses the design aspects that need to be determined, including some of the implications of those design choices. Section 3 summarises issues that were raised by industry partners and officials in discussions about the role of and desirable features of an RGT. Section 4 sets out some design options for an RGT.

The intention of this paper is to assist interested stakeholders—policy makers, the energy supply industry, energy users, NGOs with an interest in decarbonisation and energy security and affordability—to organise thinking around an RGT. The options presented are not intended to be prescriptive. We hope that they are aligned in a useful way with the broad agenda to decarbonise the Australian economy in an efficient and equitable way—and that they may provide a platform for improved specifications.

2. Design parameters for a Renewable Gas Target

There are several dimensions to the design choice for an RGT mechanism. Here we present a brief overview of them. A more detailed discussion is available in the separate Future Fuels CRC report *Understanding the implications of a renewable gas target for Australia's gas networks: Deep Dive Report.*

WHICH GASES SHOULD BE ELIGIBLE?

There are numerous possibilities including:

- all renewable gases—any gas produced with 100 per cent renewable energy—including green hydrogen and biomethane;
- all net zero gases—in addition to renewable gases, include gases that are net zero on their supply chain—for example, blue hydrogen with full carbon capture and storage and hydrogen produced; and
- selected gases, possibly within gas-specific schemes.

The goal of achieving emission reductions at least cost would best be addressed by a broad specification, taking into account any particular constraints such as safety, energy security and environmental. The decision about eligibility does not need to take into account viability of individual gases, so long as they are not individually targeted. Non-viable gases will tend not to be adopted. Moreover, the development of an RGT is not the ideal place to determine policy on nuclear power.[1]

However, if the inclusion of nuclear power and or blue hydrogen were to undermine community acceptance of an RGT, notwithstanding that those concerns equally could be addressed in some more specific policy process, then it might be desirable to limit the scope of an RGT at the outset and reconsider in the event of changed circumstances.

WHAT SHOULD BE THE BASIS FOR CREDITING GASES?

Credit approaches could be used that are neutral across renewable gas types, such as:

- credit based on energy content, neutral over gas types; and
- credit based on emission reduction impact, neutral over gas types.

A simple approach would be to base the credit on energy content.

Credits could also be based on the emission reduction impact of the renewable gas consumption, with these impacts being in the form of:

- direct impacts in the form of displacement of natural gas consumption;
- indirect effects via electrification responses, taking into account the increased demand for electricity and emissions from electricity generation; and
- impacts on fugitive emissions—e.g. increased capture and of fugitive methane.

It could be difficult to credit on the basis of emission reductions as this would require consideration of peripheral displacements as a result of renewable gas.

The simplest emissions-focused approach would be to allow for natural gas displacement on a petajoule-for-petajoule basis. In this case the emission-related approach is identical to the energy content approach.

[1] Net Zero Australia (2023) considers scenarios for the costs of renewables and nuclear. On the scenario most favourable to nuclear it achieves only a 4 per cent share of Australia's energy mix by 2050. See *How to make net zero happen. Mobilisation report. July 2023.*

The capture of fugitive methane and its combustion makes a major contribution to emission reductions, even if the energy is not used. While there is a strong case to provide support for reducing fugitive methane, this is probably best left outside the RGT, e.g. relying on the Emission Reduction Fund as at present.

WHICH USES OF RENEWABLE GAS SHOULD BE ELIGIBLE?

There are many possibilities in terms of allowable use, including:

- domestic use and sales to overseas customers;
- any domestic use of renewable gas (stationary and transport);
- stationary domestic use of renewable gas;
- some of:
- gas-fired-generation;
- distribution networks;
- off-network consumers; and
- transport

The decision about which uses to allow may be affected by whether the policy objective is short-term emission reductions or supply chain development (or something else).

A scheme which is neutral has prima facie efficiency advantages, in terms of seeing the renewable gas go to the use in which it is most valuable (which might mean the use with minimal adaptation costs).

However, a neutral scheme might lead to a situation where a renewable gas went entirely to one use, e.g. gas-fired-generation. This would mean that parallel supply chains would not have the chance to develop.

SHOULD THERE BE SEGMENTATION?

Segmentation means having separate targets for different gases and/or different gas uses.

Segmentation is at odds with principles of broad neutrality. Under broad neutrality, renewable gas types and uses will be determined by commercial decisions that take into account commercial returns. This neutrality is prima facie efficient, as it allows choices of what gas to produce and how to produce it are based on lowest cost and most valuable use.

But a neutral approach could lead to uneven development of gases both in production and in the downstream supply chains to use them. For example, all effort might go into biomethane with the development of the green hydrogen supply chain then neglected.

Neutrality might be an overriding principle if the purpose is to identify the most cost-effective alternatives to natural gas in the market today.

Neutrality might need to be compromised if the objective is developing a number of supply chains and/or diversifying the renewable gas mix for diversity and supply security.

WHO SHOULD MEET THE COSTS?

There are numerous possibilities, ranging from imposts on very broad groups to imposts on much narrower groups. The RGT effectively delivers subsidies to producers of renewable gas and the cost of these subsidies could be met by:

- taxpayers broadly;
- domestic energy consumers;
- domestic stationary energy consumers;
- domestic gas consumers; and

- domestic gas consumers and exporters.

The party that pays need not be the same as the party that uses the gas. Decisions about who pays have implications for efficiency, equity, and fairness and may also be influenced by those norms.

Sometimes a “beneficiary pays” approach is seen as being the fairest approach. But the application of a “beneficiary pays” approach is not necessarily straightforward. Insomuch as an RGT is supposed to scale up the sector and deliver cost reductions in future, some of the main beneficiaries are future gas users and they are not necessarily identical to current gas users.

Legal liabilities to pay should probably rest with large users such as retailers and large customers of wholesalers. The collection costs would be much lower than with direct collection from consumers. In well-functioning markets the economic incidence should be similar, falling on gas producers and consumers, whichever approach is taken. This is the approach taken with the Renewable Energy Target in the electricity sector.

The long-term economic incidence of a cost impost on exporters is likely to fall mainly on Australian producers of the export commodities. The Australian export sector as a whole may benefit from the development of a green hydrogen industry to take the place of any reduction in demand for natural gas products. These benefits may be particularly significant for the owners of good renewable electricity resources and for resource processers such as green steel. There may not be significant benefits for natural gas producers.

SHOULD TARGETS BE SET IN TERMS OF QUANTITIES OR PRICES?

Targets can be set in quantitative terms, such as:

- a designated percentage of gas sales;
- a designated quantity of renewable gas;

or in terms of a specified price/subsidy:

- a designated price for renewable gas; or
- a designated subsidy for renewable gas.

In a world with no uncertainty—perfect knowledge of the future—the choice between quantitative and subsidy mechanisms would not matter.

The choice between these different approaches affects the way that uncertainty is allocated. Therefore the choice depends on how the policy maker wants to allocate uncertainty—who should be protected from it and who should bear the brunt of unavoidable uncertainty.

A quantity target could be specified each year for the duration of the RGT—say 10 years for the sake of discussion. The quantities could be declared in PJ each year for 10 years. Or they could be declared in percentage terms at the outset for 10 years.

Alternatively, the scheme could target prices. A scheme could be implemented that guarantees the renewable gas producer a price per PJ (for a specified quantity). Or it could offer a specified subsidy per unit of eligible gas, with the producer then selling the renewable gas in the market.

The two approaches differ in the uncertainties that renewable gas producers face. They also differ in terms of the uncertainty faced by liable parties.

A review could be scheduled during the life of the scheme to adjust in light of emerging circumstances. However, it would be important that this review not introduce significant extra risks for investors.

One informative model is the RET, which has a two-stage process. It sets targets in quantitative terms for several years ahead. It then estimates the percentage share of renewable gas in the market. The within-year obligation on liable parties is then based on this percentage—e.g. surrender 20 Renewable Energy Certificates per 100 MW of electricity.

BILATERAL TRANSACTIONS OR POOLED SCHEME?

Under a bilateral transactions scheme, eligible producers create Renewable Gas Certificates (RGCs) and sell them to liable parties who must surrender them—this is the approach taken in the RET.

Under a pooled RGT scheme, renewable gas producers would sell RGCs into a pool which funds itself from liable parties. This is the approach taken in the National Electricity Market.

A pooled scheme is somewhat more flexible in terms of who pays. The pooled scheme could collect funds from the same parties as would be liable under a bilateral transactions model, but it could also be supported by payments from government.

A pooled scheme may be classified as a tax and a government expenditure. A bilateral mechanism is more likely to stay off-budget. In terms of market incentives the differences should be minimal, for a given allocation of supports and costs.

Both bilateral and pooled schemes can be designed to allow voluntary, above-target purchases of renewable gases.

Both bilateral and pooled schemes rely on accreditation of renewable gas producers—e.g. Guarantee of Origin.

GEOGRAPHIC SOURCING OF RENEWABLE GAS

An RGT scheme could require that renewable gas be produced:

- anywhere;
- within Australia; or
- in selected regions of Australia, such as specific States.

Should renewable gas produced overseas be eligible? In the electricity market, under the RET, this issue does not arise.

From cost minimisation perspective there is no prima facie reason to encourage or discourage any location over another. However, if the intention is to deliver an Australian supply capability the scheme might be limited to Australian producers.

Schemes introduced and proposed by State Governments to date all have State preference, allowing only renewable gas from within their State. This is motivated by a desire to develop state energy systems, but risks missing out on lowest-cost supplies. State preference is at odds with the type of neutrality measures that have been negotiated and applied in east Australian electricity and gas markets.

NATIONAL OR STATE SCHEMES?

An RGT could be introduced by means of:

- a national scheme with uniform rules that do not discriminate between States; or
- State schemes which potentially discriminate between States.

A uniform national scheme is likely to be the most efficient approach to a particular policy objective.

State schemes have been important when national government has been slow to move. State schemes also provide some scope for learning from applying different approaches.

A national scheme can leave discretion to the States to incentivise accelerated development within their own boundaries. This is what has happened with the Renewable Energy Target in the electricity market.

WHAT AMBITION SHOULD AN RGT HAVE?

- How ambitious should an RGT be in the near term, e.g. over the next 5 to 10 years?
- Should an RGT extend beyond the next 10 years, e.g. to 2050 when Australia seeks to be net zero?

RGT horizons should be long enough to provide some certainty for investors. This certainty requirement can be understood in the context of long-term hedging contracts: e.g. a renewable gas producer sells 10 years of RGCs up front to a liable party.

The near term is an essential step to the longer term. An ambitious long-term target with a complacent medium-term target may not be credible and could undermine early-stage efforts to decarbonise.

CONCESSIONS

Should there be concessions for:

- trade-exposed industry;
- exposed regions; and/or
- vulnerable households?

The owners of trade-exposed industry have opportunities to diversify their exposures. While there is a case for allowing reasonable planning horizons, the case for concessions to owners is generally weak.

People who live in regions which are heavily dependent on at-risk heavy industry unavoidably have exposures to that heavy industry. These exposures may take the form of risks of job loss and the need to relocate within Australia and also the loss of value of the homes that they own. The adjustment costs that they face may be large.

Policymakers need to consider whether to assist local communities by providing RGT concessions to preserve heavy industry—an effort which may fail—or by separately paying adjustment assistance to compensate for costs of adjustment. The Productivity Commission has recently raised this issue in connection with adaptation to climate change, and similar principles apply in respect of regional structural adjustments related to the energy transition.[2]

An RGT may impact on energy costs faced by some vulnerable households. In principle some concessions could be allowed, but in practice it would be difficult to structure the scheme to deliver them. Arguably energy cost stress may be better addressed with holistic measures of energy costs and relief measures that respond to those holistic costs.

INTERACTION WITH OTHER SCHEMES (E.G. SAFEGUARD)

How should an RGT interact with other schemes such as:

- the Safeguard mechanism
- existing State-based schemes
- national supply-side initiatives—e.g. Hydrogen Headstart
- pilot programs

Interaction with the Safeguard is an important issue for a national RGT. In the absence of the Safeguard a neutral RGT has the potential to deliver renewable gas to where it can most cost-effectively be used. With the overlay of the Safeguard, there may be an incentive to send more renewable gas to covered entities who can use

[2] In the Productivity Commission's recent (2023) *5-year Productivity Inquiry: Advancing Prosperity,* it recommended that:

> *"Transitional assistance should not distort adaptation decisions … If transitional assistance is provided to climate-impacted regions, industries, and workers, it should be structured in a way that lets people decide which regions, sectors, and occupations they are best placed to transition into. It should not be made conditional on recipients committing to live or work in a particular region, sector, or occupation." [p. 31]*

it to reduce reported emissions (and away from non-covered facilities which do not report emissions). This is a distortion, which gives rise to an efficiency loss and more generally concerns about gaming the system.

This problem could be avoided by ensuring that the emission reductions from renewable gas savings are not reported on a "where the renewable molecule is burned" basis (or on the basis of where the carbon-emitting molecule is displaced). Two possibilities are:

- a "Scope 1" treatment: to use a "Scope 1" treatment for gas, similar electricity—setting a sectoral baseline for gas and then excluding it from Scope 1 emissions; or
- an "averaging" treatment: structure the emissions reporting formula so that gas users report as if they had an average quantity of renewable gas use (so those with high renewable gas use would have some extra emissions imputed and those with low renewable gas use would have a reduced level of emissions imputed), with this avoiding the more substantial departure from established practice entailed with introducing a Scope 1 approach for gas

The design of an RGT should also take into account the Guarantee of Origin (GOO) scheme presently under development by the Australian Government. Unless there are compelling reasons to the contrary, an RGT should dovetail with the GOO.

An RGT mechanism can also accommodate easily a voluntary surrender of certificates. It can help to ensure that there is genuine additionality when parties decide to buy renewable gas certificates over and above what is required for surrender under the RGT. Thus, it allows interested parties to take the growth of renewable gas further than required in the target.A safety valve: an opt-out clause

In a certificate scheme, liable parties are required to surrender RGCs. Setting an opt-out payment is useful for scheme integrity because it imposes a cost on liable parties if they fail to comply with the RGT. In addition, the opt-out can be used to give a degree of surety and protection to gas consumers. An example of the interaction of the opt-out with renewable gas producer prices and end-user gas costs is in the box below.

Suppose there is an RGT under which renewable producers generate 1 RGC per 1 TJ of renewable gas. Retailers and large gas users are required to surrender RGCs in line with the renewable gas fraction imposed by the scheme. Suppose also that the natural gas price is $15,000 per TJ.

Suppose the designer of the RGT wants to ensure that the impact on gas costs does not exceed $750 per TJ.

In a year when the scheme designer sets an RGT fraction of 1 per cent, it sets an opt-out price of $75,000 per TJ. At that opt-out price, with a 1 per cent target, the impact on the cost of total gas (combined natural and renewable gas) is about $750.

In this case, it would be cost effective to purchase RGCs so long as renewable gas can be purchased for less than $75,000 per TJ. This implies a break-even for green hydrogen of over $12/kg, which would seem to be comfortably above current feasible production costs—about twice some estimates of what is currently achievable. There are also numerous biomethane supplies that would be feasible at $75,000 TJ.

In a year when the scheme designer increased the target to 2 per cent, the opt-out payment could be reduced to $37,500 per TJ, which would keep the maximum cost impost at about $750 per TJ of total gas.

As the scheme ambition ramped up the opt-out price would be reduced to maintain the maximum cost impact. If a point was reached when the opt-out was being widely used, the scheme designer would have to consider whether it was willing to impose larger costs to accommodate increased ambition, or scale back the ambition.

The selection of an opt-out, in tandem with the selection of scheme ambition, thus can be used to put a limit on the cost impacts associated with an RGT. The scheme is able to become more ambitious over time as the costs of renewable gas decline, partly as a result of the scale and learning forced by the scheme.

The opt-out does not save the scheme designer from facing the trade-off between scheme ambition and cost impacts. But it can reduce the degree of uncertainty in the market over the medium term—e.g. over a period of say 10 years, which would be of prime importance for many investment decisions.

3. Perspectives from industry partners

A workshop with industry partners was held in Adelaide in May 23 to discuss RGT options.

AREAS OF AGREEMENT

There were a number of aspects on which there was a broad consensus. It was generally agreed that an RGT should:

- be based on quantitative targets (not a subsidy target);
- credit renewable gas on the basis of energy content (not emission reductions);
- focus on stationary energy use and exclude transport and exports; and
- aim for few or no concessions.

There is also broad agreement in principle that an ideal RGT mechanism would be a national scheme. But this view relates to an ideal national scheme. Insomuch as a respondent views a national scheme as less than ideal there is still an appetite for state-based schemes that do better. This point highlights the importance of a consensual approach to policy making.

There was general agreement that an RGT would be location neutral for the purposes of lowest-cost renewable gas. However, some industry partners noted that it would be undesirable if the scheme design meant that some States received no renewable gas transition effort. Some industry partners also acknowledged that States regard local production as an important component of their economic development strategies, and from this point of view there might need to be some departure from location neutrality.

It was generally agreed that an RGT would need to carefully designed and monitored to avoid setting off a “death spiral” on the gas networks. There was also some interest in the idea of a broad liability base for an RGT in recognition of this issue – e.g. inclusion of all stationary energy.

AREAS OF DISAGREEMENT OR UNCERTAINTY

There were also design aspects on which there were diverging opinions.

Some respondents felt that restricting the scheme to renewables was too tight and that net-zero is a more relevant criterion. Relatedly, the exclusion of blue hydrogen was unwarranted. Others felt that its inclusion might undermine acceptance of the scheme as there is a degree of scepticism about the realism of technologies relying on full carbon capture and storage.

In principle respondents favoured technology neutrality and therefore a uniform scheme without segmentation. But there was also a view that if this led to the development of just one gas, say biomethane, to the neglect of others, such as green hydrogen, then that might be an undesirable outcome. And if the RGT stimulated the uptake of renewable gas in, say, gas-fired-generation but not networks, that too might be a bad outcome.

Respondents were unsure on the best funding approach in an RGT. On the one hand a taxpayer-funded scheme or a scheme funded by all final energy users would assist to spread the costs broadly. On the other hand it might be harder to build support for this approach.

Respondents were ambivalent on some issues or thought they could only be addressed when more details of the scheme structure were confirmed (eligible gases, who pays, etc):

- should the scheme use bilateral transactions in RGCs or should it be a pooled scheme?
- should targets be specified to 2050 or for a shorter period, e.g. to 2035?
- how should the RGT interact with the Safeguard Mechanism and/or other schemes/policies?

There were also some remnant questions. What about chemical feedstocks? What about renewable gas used to create transport fuels? Would the voluntary surrender of certificates be permitted?

4. Perspectives from policy makers

We held conversations with a number of officials to gauge opinions about an RGT. This section summarises the themes that emerged in those discussions. It summarises opinions that were expressed to us. We have sought to convey what was said, without endorsing or rebutting particular points of view. The perspectives put forward do not prescribe the design of an RGT but they give an indication of what might be important to policy makers.

POTENTIAL ROLE OF RENEWABLE GASES

Decarbonisation of the Australian gas system will be achieved by both electrification and renewable gas. Renewable gas will become an essential component of the energy mix as some gas users cannot electrify—industrial heat users particularly. However, there are differences of view as to the likely size of the contributions from electrification and renewable gas.

Renewable gas supply chains are underdeveloped. In the absence of broad measures like emission quotas or emission charges, energy policy comprises a mixture of demand and supply side initiatives to develop renewable energy supply chains.

Heavy industry and electricity generation

Policymakers see a clear requirement for renewable gas in heavy industry and gas-fired-generation, although the specific details such as demand volume, location and gas type are uncertain. Green hydrogen is expected to have a major role, particularly at hydrogen hubs, and in gas-fired-generation, alongside significant export potential. Biogas and biomethane are also potentially useful in heavy industry and generation.

Distribution networks

The role of renewable gas in distribution networks, and indeed the future of distribution networks, is uncertain. While hydrogen blending reduces emissions from gas consumers it cannot deliver decarbonisation. Decarbonisation ultimately requires the complete replacement of natural gas, which requires biomethane and the adoption of pure hydrogen on parts of the distribution network.

Some of the people we spoke to voiced pessimistic views about the future of the gas distribution networks. It was said that distribution network customers, including most household and commercial gas consumers, will sooner or later switch to electricity because renewable gas is too costly an alternative. In this view, there is insufficient cost-competitive renewable methane to replace natural gas, meaning that hydrogen would be needed to maintain gas distribution networks at current scale. But green hydrogen is too costly and the logistics of the transition to it are too challenging. These pressures are therefore expected to divert distribution customers to electricity and the consequent loss of density on the networks will further encourage that transition.

Some of the people we spoke to pointed to possible difficulties with mass electrification. This would underpin a role for gas distribution networks in the medium term, with longer term prospects then depending on emerging costs. Whether biomethane can be sourced, and at what cost, is an important issue. They noted the potential for substantial costs expanding the electricity networks to accommodate electrification and consequent increases in peak loads. They also pointed to the need for costly electricity storages in a system which will become increasingly reliant on variable generation and with diminishing dispatchable generation capacity. Variable generation itself is cheap, but it requires substantial complementary infrastructure that was not needed with traditional forms of dispatchable generation.

There is a potential to use biomethane in distribution networks. But at present there is no commercial scale biomethane in networks. There was a general view that biomethane can play a role but there is uncertainty about how much biomethane will be available at acceptable cost.

Other uses of renewable gases

Renewable gas also has a potential role in the decarbonisation of transport. The decarbonisation of transport primarily involves replacing petroleum with electricity and renewable gas.

RGT DESIGN CONSIDERATIONS

Alignment with national and state energy policy frameworks

Policymakers emphasised that an RGT would need to fit into the broader energy policy framework established by the Australian and State Governments. Alignment with existing mechanism like the Safeguard Mechanism and the Guarantee of Origin (GO—under development) would be important. Those existing mechanisms may also need to evolve to address renewable gas appropriately, e.g. inclusion of biomethane in the GO.

Costs and related policy impacts and sensitivities

Policy makers emphasise that cost considerations are always of high importance when considering energy policy options and they are important in considering an RGT. There are inevitable costs to decarbonising the energy system, but proposed solutions like an RGT need to be cost effective. Any proposal to introduce an RGT will invite the question: what is the impact on costs to gas customers? Cost sensitivities are particularly acute today, given the surge in energy costs over the last eighteen months.

From a policy perspective, there are particular sensitivities around low-income households and trade-exposed industry.

There might be a need to protect some households from the impact of an RGT on gas bills. It might also be necessary to assist with any costs forced on households during a transition—e.g. appliances replacement. (Which might also be true in the event of electrification forced by a gas network closure.)

There would need to be careful consideration of the impact of an RGT on trade-exposed customers and especially those in regional economies with high exposure. The design might need to be adjusted to limit adverse impacts on these customers.

Cost impacts on energy customers depend both on the ambition of the scheme and the allocation of costs (as well as any reductions in the cost of renewable gas over time). Costs could be imposed on domestic gas customers alone, perhaps with concessions for some groups. But they could also be imposed more broadly across stationary energy forms, i.e. including electricity consumers, recognising that the role played by renewable gas has implications not just for the gas system but also for loads on the electricity system. And in the case of hydrogen, an RGT scheme could also spread the funding burden onto export gas, recognising that the export sector is likely a major beneficiary of bringing hydrogen to scale.

Other policy considerations and requirements

The complexity of the energy and emissions policy environment raises the risk of unintended consequences from new policy mechanisms. Within the overarching goal of reducing emissions, it is important to avoid high-cost solutions to energy needs and to avoid low-value uses of energy.

The private sector has a central role in Australia's energy system. It is important therefore to get the investment signals right, to ensure that sufficient investments are made and of the right type. This includes striking the right balance in the compromise between policy certainty—as desired by investors—and the flexibility to respond to changing circumstances—desired by policy makers.

Australia needs to keep its energy options open. Emission reductions will get harder and more costly to achieve as Australia proceeds towards net zero. The policy environment needs to support technology experimentation and innovation to identify new, lower-cost energy solutions that can assist in keeping transition costs down.

5. Options for a Renewable Gas Target

This section presents nine options for a renewable gas target. These options are just a handful of the vast number of configurations that could be considered. The selection is motivated by the goal to identify options that develop the role of renewable gas in the Australian energy system. The options presented focus on illustrating the different degrees of intervention in the fuel mix and different approaches to allocating costs.

All of the options presented here share the following features:

- renewable gas producers generate RGCs based on energy content
- retailers/large users and in one case gas exporters must surrender RGCs in line with energy content of their sales/use
- voluntary surrenders permitted
- quantitative target based on renewable gas energy content
- national scheme
- neutral as to source of renewable gas
- no concessions specified
- integration with Safeguard Mechanism and alignment with Guarantee of Origin

All but one of the options specified use a bilateral transactions model, in which liable parties purchase RGCs from eligible producers and then surrender them to extinguish liability – the model used in Australia's Renewable Energy Target. Each of these eligibility/liability/target configurations could also be implemented using a pooled arrangement. The pool could conduct annual reverse auctions for a specified number of RGCs each year for several years (say 10 years). Each year the pool would then have a cost of paying for the RGCs purchased for that year in all past auctions, and it would set a contribution rate for liable parties to recover that cost. We have also included one option, Option I, which involves a pooled arrangement with government providing funds to cover the costs of the pool (essentially the model used with the Emissions Reductions Fund).

A brief description of the options and their pros and cons follows, with more comprehensive explanations in the tables below. Four of the options involve segmented targets—separate targets for green hydrogen and renewable methane. This approach is at odds with the principle of technology neutrality but could be justified if there are sufficiently large market failures that impede the developments of supply chains for these fuels.

Option A is neutral across all carbon net-zero gas types, thus it admits blue hydrogen with full CCS and hydrogen from nuclear. It excludes exports and transport use but otherwise is neutral with respect to use of the gas. It sets target renewable gas proportions out to 2050, in which year it reaches a 100 per cent renewable gas requirement (i.e. natural gas is fully displaced). The implicit costs of the renewable gas subsidies are met mainly by all domestic gas consumers.

- Pros: Clearly articulates path to net zero, technology neutral
- Cons: May be too ambitious, price impacts uncertain, may not support late developing gases, and inclusion of blue hydrogen and nuclear may undermine credibility

Option B is the same as Option A except that it restricts eligibility to renewable gases. It is neutral across renewable gas types. It excludes exports and transport use but otherwise is neutral with respect to use of the gas. It sets target renewable gas proportions out to 2050, in which year it reaches a 100 per cent renewable gas requirement (i.e. natural gas is fully displaced). The implicit costs of the renewable gas subsidies are met mainly by all domestic gas consumers.

- Pros: As per A but avoids complications around blue hydrogen and nuclear
- Cons: As per A but does not provide scope for blue hydrogen with CCS or hydrogen

Option C is the same as Option B except that it sets a target only until 2035, when a 20 per cent renewable gas fraction is required. This RGT is focused more on development of renewable gas supply chains, and comes to an end when a degree of maturity is reached at 20 per cent of total gas.

- Pros: As per B but leaves open the question of what happens post 2035
- Cons: As per B, but provide a pathway only to 2035 and does not reach net zero

Option D is similar to Option C, except that it segments the renewable gas types, and targets green hydrogen and renewable methane separately. The rationale for this option is that an untargeted scheme may see all of the renewable gas growth take place with biomethane. In this case the scheme might not provide effective support to progress green hydrogen to scale. The scheme sets earlier targets for renewable methane in recognition of this. It is likely that the renewable methane target would be met by biomethane, but other forms such as synthetic methane qualify too.

- Pros: As per C, but ensures the development of both green hydrogen and renewable methane
- Cons: As per C, but no longer technology neutral on renewable gas choice

Option E is similar to Option D, except that in this case electricity users also contribute to the costs of the scheme, in addition to domestic gas users. The rationale for this option is that the gas and electricity systems are integrated and they may become further integrated in the future. Measures that reduce the need to expand the electricity system, such as the development of renewable gas, benefit electricity consumers as well as gas consumers. In addition, renewable gas has an important role to play in firming the electricity system. RGC surrender rates are set separately for liable gas and electricity entities to achieve a desired cost sharing outcome.

- Pros: As per D, but avoids potential distortions to gas/electricity choice
- Cons: As per D, but potentially problematic to impose costs on electricity consumers

Option F is similar to Option E, except that in this case it extends to transport. Transport use of renewable gas (including the manufacture of transport fuels from renewable gas) is a permitted use under this version of an RGT. In addition to gas and electricity retailers and large users, wholesalers of petroleum are liable to surrender RGCs and pass the associated costs on to consumers of petroleum. RGC surrender rates are set separately for liable gas, electricity and petroleum entities to achieve a desired cost sharing outcome. Although support wasn't expressed for extending an RGT to transport (at a project workshop noted in Chapter 3 of this report), this option has been included because renewable gases—for example green hydrogen and derivative fuels—have potential applications in transport.

- Pros: As per D, but includes transport which is a potential user of renewable gas and spreads costs onto transport energy users which potentially benefit
- Cons: Leaves unanswered the question of how net zero will be achieved, price impacts uncertain, not technology neutral over different gases, and does not provide scope for blue hydrogen with CCS or hydrogen

Option G is similar to Option D, except that in this case exports of gas are included in the scheme. On top of the domestic green hydrogen and renewable methane targets in Option D, targets are also set for export green hydrogen and the obligation to surrender RGCs is extended to gas exporters on the basis of energy content. Although support wasn't expressed for extending an RGT to gas exports (at a project workshop noted in Chapter 3 of this report), it is included because overseas customers may over time seek to replace natural gas and coal with renewable gas, and the establishment of a renewable gas capability would allow Australia's gas export industry to participate in the new market opportunities arising. Australia's gas exports are much greater than domestic consumption, and this option would see exporters meeting a substantial part of the costs of the RGT.

- Pros: As per D, but allocates costs to gas export sector which is a potential beneficiary of renewable gas export sector development and can diminish cost burden for domestic gas consumers
- Cons: As per D, but potentially problematic to impose costs on exporters in light of sovereign risk concerns

Option H is similar to Option G, except that in this case targets are applied by use for generation, hubs, network customers and exports.

- Pros: As per G, but ensures development across all end use supply chains

- Cons: As per G, but sacrifices neutrality across uses

Option I is similar to Option C, except that it employs a pooled funding model and is funded directly by government from the budget. The rationale for this option is that by accessing funds from central government the costs are spread broadly, without distortions to existing patterns of energy use, and the funds come from efficient broad-based taxes.

- Pros: As per C, but uses broad based taxes for funding, with associated efficiency advantages
- Cons: As per C, but costs are in this case “on budget”

Option A: A RET-like RGT - any carbon net-zero gas – emission reduction focus – domestic gas users bear cost

Dimension	Specification	Comment
Eligible fuels	All carbon net-zero gases	Including blue hydrogen with full CCS, hydrogen from nuclear
How are eligible gases credited?	Certificate scheme with 1 RGC per TJ renewable gas	Credit based on energy content
Scope of use?	Stationary domestic final use.	Exports and transport use/fuel production out of scope
Who pays?	Legal liability sits with gas retailers and large domestic gas users who pass costs on mainly to end customers	Economic incidence falls mainly on gas consumers, with a fraction of costs passed back to natural gas producers.
Segmentation?	Uniform scheme	No segmentation within eligible fuels and uses
Quantitative targets or subsidies?	Forward schedule based on quantities declared for 10 years	RGC surrender rate declared annually in advance based on quantity target plus/minus previous year shortfall/overrun
Bilateral transactions or pooled scheme?	Bilateral transactions	Renewable gas producers create RGCs and sell them to liable parties
Geographic sourcing of renewable gas	Australia, location neutral within Australia	Liable parties can meet surrender obligations with RGCs created anywhere in Australia
State or national scheme	National scheme	Uniform rules across the States
Ambition of scheme and targets/timeframes	Target energy proportion of renewable gas in total domestic gas consumption by energy content (total gas = natural gas plus renewable gas): • 2026: 1 per cent • 2030: 5 per cent • 2035: 20 per cent • 2040: 50 per cent • 2045: 85 per cent • 2050: 100 per cent	Targets are firm minima to 2035 subject to ramping up on review Targets after 2035 until 2050 are planning targets subject to review Review scheduled for 2029
Concessions	No concessions for any liable parties.	Large gas users may have concessions under the Safeguard Mechanism Cost impacts on vulnerable consumers addressed separately through holistic energy packages
Interaction with other schemes	Safeguard Mechanism interaction handled with averaging treatment Fugitive methane capture continues to be supported by Emissions Reduction Fund	Avoid distortions to use of the gas molecules Gas consumers pay only for displacement of natural gas consumption, not for capture of fugitives from other sectors
Opt-out	$75,000 per RGC subject to 2029 Review	

Option B: A RET-like RGT – renewable gas only – emission reduction focus – domestic gas users bear cost

Dimension	Specification	Comment
Eligible fuels	All renewable gases	Green hydrogen and biomethane most prospective
How are eligible gases credited?	Certificate scheme with 1 RGC per TJ renewable gas	Credit based on energy content
Scope of use?	Stationary domestic final use.	Exports and transport use/fuel production out of scope
Who pays?	Legal liability sits with gas retailers and large domestic gas users who pass costs on mainly to end customers	Economic incidence falls mainly on gas consumers, with a fraction of costs passed back to natural gas producers.
Segmentation?	Uniform scheme	No segmentation within eligible fuels and uses
Quantitative targets or subsidies?	Forward schedule based on quantities declared for 10 years	RGC surrender rate declared annually in advance based on quantity target plus/minus previous year shortfall/overrun
Bilateral transactions or pooled scheme?	Bilateral transactions	Renewable gas producers create RGCs and sell them to liable parties
Geographic sourcing of renewable gas	Australia, location neutral within Australia	Liable parties can meet surrender obligations with RGCs created anywhere in Australia
State or national scheme	National scheme	Uniform rules across the States
Ambition of scheme and targets/timeframes	Target energy proportion of renewable gas in total domestic gas consumption by energy content (total gas = natural gas plus renewable gas): • 2026: 1 per cent • 2030: 5 per cent • 2035: 20 per cent • 2040: 50 per cent • 2045: 85 per cent • 2050: 100 per cent	Targets are firm minima to 2035 subject to ramping up on review Targets after 2035 until 2050 are planning targets subject to review Review scheduled for 2029
Concessions	No concessions for any liable parties.	Large gas users may have concessions under the Safeguard Mechanism Cost impacts on vulnerable consumers addressed separately through holistic energy packages
Interaction with other schemes	Safeguard Mechanism interaction handled with averaging treatment Fugitive methane capture continues to be supported by Emissions Reduction Fund	Avoid distortions to use of the gas molecules Gas consumers pay only for displacement of natural gas consumption, not for capture of fugitives from other sectors
Opt-out	$75,000 per RGC subject to 2029 Review	

Option C: A RET-like RGT – renewable gas only – renewable gas supply chain development focus – fuel-neutral – domestic gas users bear cost

Dimension	Specification	Comment
Eligible fuels	All renewable gases	Green hydrogen and biomethane most prospective
How are eligible gases credited?	Certificate scheme with 1 RGC per TJ renewable gas	Credit based on energy content
Scope of use?	Stationary domestic final use.	Exports and transport use/fuel production out of scope
Who pays?	Legal liability sits with gas retailers and large domestic gas users who pass costs on mainly to end customers	Economic incidence falls mainly on gas consumers, with a fraction of costs passed back to natural gas producers.
Segmentation?	Uniform scheme	No segmentation within eligible fuels and uses
Quantitative targets or subsidies?	Forward schedule based on quantities declared for 10 years	RGC surrender rate declared annually in advance based on quantity target plus/minus previous year shortfall/overrun
Bilateral transactions or pooled scheme?	Bilateral transactions	Renewable gas producers create RGCs and sell them to liable parties
Geographic sourcing of renewable gas	Australia, location neutral within Australia	Liable parties can meet surrender obligations with RGCs created anywhere in Australia
State or national scheme	National scheme	Uniform rules across the States
Ambition of scheme and targets/timeframes	Target energy proportion of renewable gas in total domestic gas consumption (total gas = natural gas plus renewable gas): • 2026: 1 per cent • 2030: 5 per cent • 2035: 20 per cent	Targets are firm minima to 2035 subject to ramping up on review No targets past 2035 as industry will have matured by then Review scheduled for 2029
Concessions	No concessions for any liable parties.	Large gas users may have concessions under the Safeguard Mechanism Cost impacts on vulnerable consumers addressed separately through holistic energy packages
Interaction with other schemes	Safeguard Mechanism interaction handled with averaging treatment Fugitive methane capture continues to be supported by Emissions Reduction Fund	Avoid distortions to use of the gas molecules Gas consumers pay only for displacement of natural gas consumption, not for capture of fugitives from other sectors
Opt-out	Initially $75,000 per RGC, phasing down to ensure maximum cost burden of $750 per TJ of total gas use subject to 2029 Review	

Option D: RGT – green hydrogen and renewable methane supply chain development focus – fuel-targeting – domestic gas users bear cost

Dimension	Specification	Comment
Eligible fuels	Green hydrogen and renewable methane	GO would need to cover renewable methane Biomethane is most prospective methane but synthetic methane is eligible
How are eligible gases credited?	Certificate scheme with 1 RGC per TJ renewable gas	Credit based on energy content
Scope of use?	Stationary domestic final use.	Exports and transport use/fuel production out of scope
Who pays?	Legal liability sits with gas retailers and large domestic gas users who pass costs on mainly to end customers	Economic incidence falls mainly on gas consumers, with a fraction of costs passed back to natural gas producers.
Segmentation?	Segmented with separate certificates and targets for green hydrogen and renewable methane	Segmentation assures development effort for both fuel types
Quantitative targets or subsidies?	Forward schedule based on quantities declared for 10 years	RGC surrender rate declared annually in advance based on quantity target plus/minus previous year shortfall/overrun
Bilateral transactions or pooled scheme?	Bilateral transactions	Renewable gas producers create RGCs and sell them to liable parties
Geographic sourcing of renewable gas	Australia, location neutral within Australia	Liable parties can meet surrender obligations with RGCs created anywhere in Australia
State or national scheme	National scheme	Uniform rules across the States
Ambition of scheme and targets/timeframes	Target energy proportion of renewable gas in total domestic gas consumption (total gas = natural gas plus renewable gas): domestic green hydrogen / domestic biomethane • 2026: ¼ per cent / ¾ per cent • 2030: 1¼ per cent / 3¾ per cent • 2035: 5 per cent / 15 per cent	Targets are firm minima to 2035 subject to ramping up on review No targets past 2035 as industry will have matured by then Review scheduled for 2029
Concessions	No concessions for any liable parties.	Large gas users may have concessions under the Safeguard Mechanism Cost impacts on vulnerable consumers addressed separately through holistic energy packages
Interaction with other schemes	Safeguard Mechanism interaction handled with averaging treatment Fugitive methane capture continues to be supported by Emissions Reduction Fund	Avoid distortions to use of the gas molecules Gas consumers pay only for displacement of natural gas consumption, not for capture of fugitives from other sectors
Opt-out	Initially $75,000 per RGC, phasing down to achieve maximum cost burden of $750 per TJ of total gas use	

Option E: RGT – green hydrogen and renewable methane supply chain development focus – fuel-targeting – domestic stationary energy users bear cost

Dimension	Specification	Comment
Eligible fuels	Green hydrogen and renewable methane	GO would need to cover renewable methane Biomethane is most prospective methane but synthetic methane is eligible
How are eligible gases credited?	Certificate scheme with 1 RGC per TJ renewable gas	Credit based on energy content
Scope of use?	Stationary domestic final use.	Exports and transport use/fuel production out of scope
Who pays?	Legal liability sits with gas and electricity retailers and large domestic gas users who pass costs on mainly to end customers	Economic incidence falls mainly on electricity and gas consumers, with a fraction of costs passed back to natural gas producers.
Segmentation?	Segmented with separate certificates and targets for green hydrogen and renewable methane	Segmentation assures development effort for both fuel types
Quantitative targets or subsidies?	Forward schedule based on quantities declared for 10 years	RGC surrender rate declared annually in advance based on quantity target plus/minus previous year shortfall/overrun
Bilateral transactions or pooled scheme?	Bilateral transactions	Renewable gas producers create RGCs and sell them to liable parties
Geographic sourcing of renewable gas	Australia, location neutral within Australia	Liable parties can meet surrender obligations with RGCs created anywhere in Australia
State or national scheme	National scheme	Uniform rules across the States
Ambition of scheme and targets/timeframes	Target energy proportion of renewable gas in total domestic gas consumption (total gas = natural gas plus renewable gas): domestic green hydrogen / domestic biomethane • 2026: ½ per cent / 1 per cent • 2030: 2½ per cent / 5 per cent • 2035: 5 per cent / 15 per cent	Targets are firm minima to 2035 subject to ramping up on review No targets past 2035 as industry will have matured by then Review scheduled for 2029
Concessions	No concessions for any liable parties.	Large gas users may have concessions under the Safeguard Mechanism Cost impacts on vulnerable consumers addressed separately through holistic energy packages
Interaction with other schemes	Safeguard Mechanism interaction handled with averaging treatment Fugitive methane capture continues to be supported by Emissions Reduction Fund	Avoid distortions to use of the gas molecules Gas consumers pay only for displacement of natural gas consumption, not for capture of fugitives from other sectors
Opt-out	Initially $75,000 per RGC, phasing down to achieve maximum cost burden of $750 per TJ of total gas use	

Option F: RGT – green hydrogen and renewable methane supply chain development focus – fuel-targeting – domestic energy users bear cost

Dimension	Specification	Comment
Eligible fuels	Green hydrogen and renewable methane	GO would need to cover renewable methane Biomethane is most prospective methane but synthetic methane is eligible
How are eligible gases credited?	Certificate scheme with 1 RGC per TJ renewable gas	Credit based on energy content
Scope of use?	Stationary domestic final use.	Exports and transport use/fuel production out of scope
Who pays?	Legal liability sits with gas and electricity retailers, large domestic gas users and petroleum wholesalers	Economic incidence falls mainly on electricity, gas and petroleum consumers
Segmentation?	Segmented with separate certificates and targets for green hydrogen and renewable methane	Segmentation assures development effort for both fuel types
Quantitative targets or subsidies?	Forward schedule based on quantities declared for 10 years	RGC surrender rate declared annually in advance based on quantity target plus/minus previous year shortfall/overrun
Bilateral transactions or pooled scheme?	Bilateral transactions	Renewable gas producers create RGCs and sell them to liable parties
Geographic sourcing of renewable gas	Australia, location neutral within Australia	Liable parties can meet surrender obligations with RGCs created anywhere in Australia
State or national scheme	National scheme	Uniform rules across the States
Ambition of scheme and targets/timeframes	Target energy proportion of renewable gas in total domestic gas consumption (total gas = natural gas plus renewable gas): domestic green hydrogen / domestic biomethane • 2026: ½ per cent / 1 per cent • 2030: 2½ per cent / 5 per cent • 2035: 5 per cent / 15 per cent	Targets are firm minima to 2035 subject to ramping up on review No targets past 2035 as industry will have matured by then Review scheduled for 2029
Concessions	No concessions for any liable parties.	Large gas users may have concessions under the Safeguard Mechanism Cost impacts on vulnerable consumers addressed separately through holistic energy packages
Interaction with other schemes	Safeguard Mechanism interaction handled with averaging treatment Fugitive methane capture continues to be supported by Emissions Reduction Fund	Avoid distortions to use of the gas molecules Gas consumers pay only for displacement of natural gas consumption, not for capture of fugitives from other sectors
Opt-out	Initially $75,000 per RGC, phasing down to achieve maximum cost burden of $750 per TJ of total gas use	

Option G: RGT – green hydrogen and renewable methane supply chain development focus – fuel-targeting – domestic gas users and gas exporters bear cost

Dimension	Specification	Comment
Eligible fuels	Green hydrogen and renewable methane	GO would need to cover renewable methane Biomethane is most prospective methane but synthetic methane is eligible
How are eligible gases credited?	Certificate scheme with 1 RGC per TJ renewable gas	Credit based on energy content
Scope of use?	Stationary domestic final use.	Exports and transport use/fuel production out of scope
Who pays?	Legal liability sits with gas retailers, large domestic gas users and gas exporters	Economic incidence falls mainly on gas consumers, with a fraction of costs passed back to natural gas producers.
Segmentation?	Segmented with separate certificates and targets for green hydrogen and biomethane	Segmentation assures development effort for both fuel types
Quantitative targets or subsidies?	Forward schedule based on quantities declared for 10 years	RGC surrender rate declared annually in advance based on quantity target plus/minus previous year shortfall/overrun
Bilateral transactions or pooled scheme?	Bilateral transactions	Renewable gas producers create RGCs and sell them to liable parties
Geographic sourcing of renewable gas	Australia, location neutral within Australia	Liable parties can meet surrender obligations with RGCs created anywhere in Australia
State or national scheme	National scheme	Uniform rules across the States
Ambition of scheme and targets/timeframes	Target energy proportion of renewable gas in total domestic gas consumption (total gas = natural gas plus renewable gas): domestic green hydrogen / domestic biomethane / export green hydrogen • 2026: ½ per cent / 1 per cent / ½ per cent • 2030: 2½ per cent / 5 per cent / 2½ per cent • 2035: 5 per cent / 15 per cent / 5 per cent	Targets are firm minima to 2035 subject to ramping up on review No targets past 2035 as industry will have matured by then Review scheduled for 2029
Concessions	No concessions for any liable parties.	Large gas users may have concessions under the Safeguard Mechanism Cost impacts on vulnerable consumers addressed separately through holistic energy packages
Interaction with other schemes	Safeguard Mechanism interaction handled with averaging treatment Fugitive methane capture continues to be supported by Emissions Reduction Fund	Avoid distortions to use of the gas molecules Gas consumers pay only for displacement of natural gas consumption, not for capture of fugitives from other sectors
Opt-out	Initially $75,000 per RGC, phasing down to achieve maximum cost burden of $750 per TJ of total gas use	

Option H: RGT – green hydrogen and renewable methane/sectoral supply chain development focus – fuel-targeting – domestic gas users and gas exporters bear cost

Dimension	Specification	Comment
Eligible fuels	Green hydrogen and renewable methane	GO would need to cover renewable methane Biomethane is most prospective methane but synthetic methane is eligible
How are eligible gases credited?	Certificate scheme with 1 RGC per TJ renewable gas	Credit based on energy content
Scope of use?	Stationary domestic final use.	Exports and transport use/fuel production out of scope
Who pays?	Legal liability sits with gas retailers, large domestic gas users and gas exporters	Economic incidence falls mainly on gas consumers, with a fraction of costs passed back to natural gas producers.
Segmentation?	Segmented with separate certificates and targets for green hydrogen and biomethane; targets within generation, hubs, network customers and exports.	Segmentation assures development effort for both fuel types
Quantitative targets or subsidies?	Forward schedule based on quantities declared for 10 years	RGC surrender rate declared annually in advance based on quantity target plus/minus previous year shortfall/overrun
Bilateral transactions or pooled scheme?	Bilateral transactions	Renewable gas producers create RGCs and sell them to liable parties
Geographic sourcing of renewable gas	Australia, location neutral within Australia	Liable parties can meet surrender obligations with RGCs created anywhere in Australia
State or national scheme	National scheme	Uniform rules across the States
Ambition of scheme and targets/timeframes	Target energy proportion of renewable gas in total domestic gas consumption (total gas = natural gas plus renewable gas) – use sector share of: domestic green hydrogen / domestic biomethane / export green hydrogen • 2026: ½ per cent / 1 per cent / ½ per cent • 2030: 2½ per cent / 5 per cent / 2½ per cent • 2035: 5 per cent / 15 per cent / 5 per cent	Targets are firm minima to 2035 subject to ramping up on review No targets past 2035 as industry will have matured by then Review scheduled for 2029
Concessions	No concessions for any liable parties.	Large gas users may have concessions under the Safeguard Mechanism Cost impacts on vulnerable consumers addressed separately through holistic energy packages
Interaction with other schemes	Safeguard Mechanism interaction handled with averaging treatment Fugitive methane capture continues to be supported by Emissions Reduction Fund	Avoid distortions to use of the gas molecules Gas consumers pay only for displacement of natural gas consumption, not for capture of fugitives from other sectors
Opt-out	Initially $75,000 per RGC, phasing down to achieve maximum cost burden of $750 per TJ of total gas use	

Option I: A RET-like RGT – renewable gas only – renewable gas supply chain development focus – fuel-neutral – central government bears cost

Dimension	Specification	Comment
Eligible fuels	All renewable gases	Green hydrogen and biomethane most prospective
How are eligible gases credited?	Certificate scheme with 1 RGC per TJ renewable gas	Credit based on energy content
Scope of use?	Stationary domestic final use.	Exports and transport use/fuel production out of scope
Who pays?	A pool purchases RGCs prospectively by reverse auction with costs met by central government	Uses pooled mechanism Funding comes from broad-based taxes, which means costs can be met by most efficient available tax mix choice
Segmentation?	Uniform scheme	No segmentation within eligible fuels and uses
Quantitative targets or subsidies?	Forward schedule based on quantities declared for 10 years	RGC surrender rate declared annually in advance based on quantity target plus/minus previous year shortfall/overrun
Bilateral transactions or pooled scheme?	Bilateral transactions	Renewable gas producers create RGCs and sell them to liable parties
Geographic sourcing of renewable gas	Australia, location neutral within Australia	Liable parties can meet surrender obligations with RGCs created anywhere in Australia
State or national scheme	National scheme	Uniform rules across the States
Ambition of scheme and targets/timeframes	Target energy proportion of renewable gas in total domestic gas consumption (total gas = natural gas plus renewable gas): • 2026: 1 per cent • 2030: 5 per cent • 2035: 20 per cent	Targets are firm minima to 2035 subject to ramping up on review No targets past 2035 as industry will have matured by then Review scheduled for 2029
Concessions	No concessions for any liable parties.	Large gas users may have concessions under the Safeguard Mechanism Cost impacts on vulnerable consumers addressed separately through holistic energy packages
Interaction with other schemes	Safeguard Mechanism interaction handled with averaging treatment Fugitive methane capture continues to be supported by Emissions Reduction Fund	Avoid distortions to use of the gas molecules Gas consumers pay only for displacement of natural gas consumption, not for capture of fugitives from other sectors

Future Fuels CRC

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