

# Executive Summary

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*The 24/7 TRUZERO project is being undertaken by the following organisations:*

- RACE for 2030 Ltd – Cooperative Research Centre
- University of New South Wales, Collaboration on Energy and Environmental Markets
- Enosi Australia Pty Ltd
- Google Australia Pty Ltd
- Buildings Alive Pty Ltd
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*As the only project in Australia currently trialling time and location matching of renewable energy production with commercial consumption supported by “Granular Certificates”<sup>1</sup>, our consortium is particularly qualified to comment on the proposed REGO scheme. Our project is adopting certification principles developed by the EnergyTag.org organisation, which have been developed through experience in several trials of time and location matched renewable energy certificates in Europe, South America and the USA, and broad consultation with trial participants, leading organisations working internationally towards temporal matching of renewable energy (24/7 renewables), and a wide range of other stakeholders. Together we have direct experience in the design and use of certificates that include time and location attributes and our submission is informed by lessons learned in these trials.*

In the lead up to the expiration of the Renewable Energy Target legislation in 2030, we are presented with a once in a generation opportunity to improve the regulatory framework for renewable energy (RE) certification by including certificate attributes that are likely to be important in future years to allow electricity consumers to track the true impact of their consumption and better support energy transition. The addition of attributes that precisely identify the place, time, commissioning date and technology class of renewable energy generation or storage can provide a framework for policy makers and energy users to support our transition to a completely renewable energy system.

The proposals as presented in the policy position paper provide an excellent basis to move us in this direction. However, elements of the proposed Renewable Electricity Guarantee of Origin (REGO) design would hinder realisation of detailed temporal tracking and matching, including when the renewable energy is stored for later use, and may reduce clarity around additionality and therefore reduce the quality and assurance of renewable energy claims in Australia. There is also lack of clarity around how residual emissions (from energy not subject to a renewable energy purchase claim) should be tracked to calculate scope 2 emissions for all energy users. There is a risk that data required to calculate residual emissions may be incomplete since creation of REGOs will not be compulsory. It would also be helpful to see further discussion of how issues such as scope 2 emissions will be calculated for energy users who don't purchase renewables given falling grid emissions intensities.

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<sup>1</sup> Granular certificates contain detailed information about the time and location of renewable energy generation to more closely represent the physical real- world availability of clean energy sources and facilitate matching with consumption.

Achieving transition to high renewable energy penetrations and net zero emissions by 2050 is seeing increasing VRE integration challenges that require investment not only in renewable energy resources, but renewables better matched to demand as well as demand response capabilities and clean firming to ensure renewable energy is available when needed to match ever changing demand. While NEM region spot prices provide temporal price signals for each region reflecting aspects of ongoing supply-demand balance, LRET certificate prices which are used to facilitate PPAs as well as broader RE claims do not reflect the different value of RE at different times and hence distort investment incentives to drive better timed renewables as well as flexible resources that assist in their integration. For this reason, there is increasing interest internationally in renewable energy certification that enables detailed temporal and spatial matching of generation with consumption. Recent research from Princeton University<sup>2</sup> and TU Berlin<sup>3</sup> have demonstrated the potential benefits of hourly Carbon Free Electricity (CFE) strategies over annual approaches in supporting renewable energy integration.

Whether or not 24/7 matching of renewables to energy user demand gains the popularity or mandates we expect, the design of Australia's REGO scheme should aim to support the benefits of such an approach for those that want to adopt it. REGOs should ideally be developed as a robust and tradeable instrument which can correct existing mispricing of clean energy across a range of criteria including, particularly, the differing value of generation at different times and locations. Time-based REGOs would reflect the very different value of renewable generation depending on time and location, from the middle of the day with high solar generation, to winter evening demand peaks.

To deliver these types of valued added certification, it is imperative the framework aligns with the operating characteristics of the Australian Energy Market Operator (AEMO), to incorporate support for the future shift of small-scale technology under a single framework, and to effectively value energy sources capable of filling the gaps in intermittent renewable energy sources. This points to a model incorporating time, place and at a scale that is more fine-grained than proposed.

More broadly, the registry meta-data proposed for each REGO is currently insufficient for the task. The level of detail here needs to be reviewed against not just legacy certification schemes, but also against the future requirements based on the outcome of the consultation and during the development of the framework. It is vital that the metadata structure be adaptable to changing needs over time.

Finally, given the reliance of existing renewable energy accounting and marketing schemes on the Large-scale Renewable Energy Target (LRET), through its Large-scale Generation Certificates (LGC), it is important where these are either Australian or state/territory government-backed that a parallel process of harmonisation with the new framework is adopted to deliver confidence in the direction of the new REGO framework.

## Key points

The REGO scheme design provides a good basis for certifying renewable generation, but since the scheme is intended to serve beyond 2030, it should be refined to better accommodate the growing capacity of small scale generation and emerging and future renewable energy accounting trends. In particular, there is significant momentum behind the 24/7 carbon-free energy movement and related certification initiatives on a global basis. There are currently over 100 signatories to the *United Nations 24/7 Carbon-free Energy Compact*<sup>4</sup> including two national governments and with the cities of London, Paris and Copenhagen. Some

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<sup>2</sup> <https://acee.princeton.edu/24-7/>

<sup>3</sup> <https://zenodo.org/record/7180098#.Y-BMjy8Rr0o>

<sup>4</sup> 24/7 Carbon-free Energy <https://gocarbonfree247.com/our-partners/>

400 organisations are participating in the EnergyTag granular Certificate standard development. The European Union's Renewable Energy Directive (REDIII) has recommended time and location matching renewable energy claims in future guarantee of origin schemes "...a framework for electrification needs to enable robust and efficient coordination and expand market mechanisms to match both supply and demand in space and time..."<sup>5</sup>. The German H2Global program to support international imports of renewable hydrogen derivatives into Germany has recently specified hourly matching of renewable generation to electrolyser demand when using PPA arrangements.<sup>6</sup> In the United Kingdom, the Department for Business, Energy and Industrial Strategy's Green Hydrogen standard requires time-matching of energy used by electrolyser from renewable electricity inputs<sup>7</sup>. Meanwhile on an international stage, the World Resources Institute is currently considering listing time and location matching as a recommended higher level standard for Scope 2 emissions accounting in the next release of the Greenhouse Gas Protocol.

Corporate and government emissions reporting will also take these time and location characteristics increasingly into consideration as evidenced by the growing membership of the United Nation's 24/7 Carbon-free Energy (24/7 CFE) compact. We therefore believe it is important that design of the Australian REGO scheme includes time-matching of a suitable granularity and methodology to align with these global initiatives.

The LRET and the SRES both have a finite lifetime, yet there remains a need to value the contribution that these renewable resources have in providing carbon-free energy. The proposed framework should look to considerately incorporate these existing frameworks as a complimentary part of the new framework, rather than a competing and entirely parallel system.

Any long-term replacement of these existing certification schemes should ensure that we learn from the shortcomings of existing frameworks, both in Australia and globally and take account of technological change. The availability of energy traceability technology (allowing time and location matching of production and consumption), ubiquitous smart meter coverage, and proliferation of small-scale generation and storage all have significant implications for the REGO scheme. The proposed REGO scheme would improve renewable energy provenance traceability by adding temporal tracking to hourly resolution, provision to track renewable generation through storage and energy carriers such as hydrogen, and identification of commissioning date. The scheme could be further improved through the consideration of:

1. limiting distortions caused by time and location arbitrage
2. taking advantage of available best-practice data processing and management technology
3. catering for all levels of renewable certification from household to utility scale systems.

Here we list specific improvements that could be applied.

#### **1. 1 MWh / 1 hour granularity with "carry-over" undermines the purpose of time-matching**

The proposed 1MWh REGO certificate size means that when timestamping is applied there will be "overs-and-unders" in each time period. By definition, carrying energy from one time period over to a later time period invalidates the timestamp applied to that energy. This problem is exacerbated as the generation size decreases and particularly given the operating strategies for energy storage-based sources.

The time period should also be shortened closer to the point where time-arbitrage of certificates is considered unlikely. We note that a one hour time resolution is at odds with the shift by AEMO from 30 minute to five-

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<sup>5</sup> European Parliament [https://www.europarl.europa.eu/doceo/document/TA-9-2022-0317\\_EN.html](https://www.europarl.europa.eu/doceo/document/TA-9-2022-0317_EN.html)

<sup>6</sup> <https://www.hydrogeninsight.com/policy/germanys-h2global-kicks-off-world-s-first-green-hydrogen-subsidy-scheme-with-ammonia-import-tender/2-1-1369442>

<sup>7</sup> UK Department for Business, Energy & Industrial Strategy <https://www.gov.uk/government/publications/hydrogen-business-model-and-net-zero-hydrogen-fund-electrolytic-allocation-round-2022/clarification-questions-with-responses-added-9-august-2022>

minute market reconciliation in order to better capture the impacts of ever changing supply and demand. Alignment between the two would be a sound foundation for future temporal matching requirements and does not present significant technical challenges since the metering capability is already being implemented.

## **2. 1 MWh granularity poorly serves smaller generation facilities and invalidates timestamping**

The Department's policy position proposal, supported by the paper more broadly, supports REGOs from any size generator, significantly also discussing the replacement of Small-scale Technology Certificates (STC). The proposed 1 MWh REGO certificate size, however, is entirely inappropriate for small generators in the context of time matching. The proposed granularity of 1MWh at one hour resolution is insufficient when compared with the goals of the program, especially when considering the LRET which it replaces (1MWh at 1 calendar month resolution, which is ~1/730 the resolution). It would take a typical 5kW household PV system a number of weeks to create a single certificate and its timestamp would then be invalid and misleading.

## **3. Mutual exclusivity of REGOs and LGCs before 2030 creates two products with separate but overlapping voluntary certificate markets, while LGCs cannot take advantage of the additional features of REGOs**

We note that the paper suggests that time and location stamps could be applied to LGCs, but applying timestamps to LGCs is subject to issues 1 and 2 above. Without addressing LGC granularity, which would likely be too difficult to apply to the legacy LCG design, mutual exclusivity therefore requires generators to choose at the point of creation between LGCs, which could be used for surrender under the LRET or participation in a subset of voluntary schemes (e.g. those that include the additionality requirements of the RET but not those that require temporal matching); or creation of REGOs, which could also be used for participation in a potentially different subset of voluntary schemes (e.g. those that require temporal matching and may have different additionality requirements). It would be better to allow REGOs to be uniquely assigned to LGCs to allow the RE claim to potentially be used for any of these purposes, while avoid double counting.

## **4. Exclusion of secondary renewable energy sources (green hydrogen and other stored renewables) from REGOs**

We are surprised that energy generated through use of green hydrogen would not be eligible for REGOs since the policy proposals allow for REGOs to be created against the discharge of stored renewable energy in batteries. This creates a potential inconsistency between treatment of the two technologies in the policy position proposals. Assuming that REGOs are surrendered to demonstrate that the stored energy came from a renewable energy generator, the use of a range of stored renewable energy technologies, may prove to be important options for clean firming and should be incentivised in the REGO market. This is where timestamping at an appropriate resolution is critical, with strict 24/7 matching standards under discussion in both the EU and US.

## **5. Identification of accredited generator on the REGO**

It is unclear if there is an intention to include an identifier for the accredited renewable energy generator / storage facility on the REGO. The discussion paper (Figure 4) shows "renewable energy source or storage technology". This certificate attribute should identify the specific generator, storage facility or aggregation scheme (where appropriate for small scale resources), in order to facilitate participation in schemes and contracts that require this information. This is of course a feature of LGCs so its omission would be a retrograde step in transparency.

## **6. Identification of consumption points (the National Meter Identifier or NMI)**

To allow for time and location matching services, the registry should include identification of the consumption point National Meter Identifiers (NMI) against which the REGO has been matched (not just the buyer's name).

Some data privacy processes will of course be required - especially with respect to information from which the customer's load profile may be determined

Our submission recommends a straightforward solution that would address all these issues. It is our view that:

- REGOs should be a fixed time period, variable volume instrument with an accuracy down to 1Wh. This could follow the recommended design of EnergyTag granular certificates, the world's leading best-practice approach to timestamped certificates.
- REGOs, and by extension the REGO registry, should enable functionality to allow "*splitting*" of variable volume REGOs. This would enable the transactions of a portion of the original REGO, and also enable accredited third-party originations to perform "matching" of a customer's consumption at the NMI level to particular REGOs delivering accuracy of time and volume.
- REGOs with time and location stamps should be allowed to be created for the same energy production as LGCs, provided that such REGOs are appropriately identified, or "*tagged*", as such. These can only be surrendered in parallel with an equivalent number of LGCs by the same entity to avoid double counting.

REGOs should become the superset, with LGCs and STCs continuing with the option to "link" (with the appropriate supporting data) to REGOs, where the LGC and REGOs are jointly surrendered, and the REGO holding appropriate parallel certificate information.

## **7. Ensuring quality is not undermined by relaxing additionality requirements**

While we recognise the objective of facilitating the export of competitively priced "green" products from Australia, we are concerned that relaxing the additionality requirements for accredited generators will undermine the quality of the certificates and the functionality of the voluntary LGC market. The additional supply of REGO certificates from previously ineligible generation can be expected to lower the demand and price of LGCs, potentially undermining voluntary efforts to drive investment in new renewable energy generation.

## **8. Residual emissions tracking**

Temporal tracking of scope 2 emissions is advocated by signatories to the *United Nations 24/7 Carbon-free Energy Compact* and revision to include temporal tracking is under consideration by the World Resources Institute. As such, in addition to voluntary schemes, GHG protocols that apply to Australia's international commitments seem likely to require detailed tracking of emissions that will rely on tracking of claimed renewable energy generation in order to calculate emissions intensity of the residual grid electricity that can be used to calculate scope 2 emissions for consumption that is not met by a renewable energy claim. The department should outline how the proposed approach would support calculation of residual emissions and seek feedback from stakeholders on its fitness.

# Policy paper review

## Introduction

We recognise that the timing of the release of the discussion paper has likely been hastened by the need to introduce a Guarantee of Origin scheme for Hydrogen, but urge the Australian Government to also take this opportunity to facilitate careful transition from the LRET and SRES schemes to a best of class framework for the certification of renewable energy sourced electricity for Australia.

## Policy Context

The policy goal to “...*achieve net zero emissions by 2050...*” necessarily requires a significant and rapid transition of the electricity grid to renewable energy, not only in a general sense, but one that rapidly closes in on a 100% 24/7 carbon-free energy goal. At higher penetrations, technical challenges arise due to temporal mismatch between key renewable energy sources, notably wind and solar, and their limited dispatchability to contribute to meeting ever changing demand. They therefore require “firming”, often from fossil fuel sources at present, and likely from a range of flexible resources including battery and other storage technologies as well as flexible demand into the future. Therefore, the full decarbonisation of electricity grids requires more than the expansion of renewable energy capacity, it also requires attention to making RE capacity available when it is required for consumption (Miller, 2020). In addition to facilitating the export of RE, ‘green’ or low-emissions products, as noted in the discussion paper, a REGO extending beyond the expiration of the RET legislation is critical to verify and facilitate RE purchases and investment, and to implement RE targets, policy and voluntary schemes.

Additionality is a key requirement for regulatory and voluntary schemes intended to drive the transition from fossil fuels to renewable electricity. In general, additionality refers to additional renewable energy or emissions reduction compared to the counterfactual (without the policy instrument/scheme). Under the RET, matching consumption to renewable energy generation through the use of certificates (e.g. under the GreenPower scheme or in the case of most renewable energy PPAs) can distinguish additionality beyond the annual renewable energy generation target that must be met by retirement of certificates by liable entities. Additional investment in Renewable Energy capacity is driven by scarcity of certificates, and was the key objective of the RET.

The value of additional renewable energy generation or capacity in terms of emission reductions and its contribution to achieving transition to higher renewable energy penetrations, varies spatially and temporally. When measured at a coarse temporal or spatial resolution (e.g. annually, nationally), a clear price signal for the additional capacity required can be undermined, for instance if certificates from a period with plentiful renewable energy can be used to claim renewable energy consumption by a load during a period where existing renewable energy generation is scarce. Temporal and spatial attribution would assist in driving additional investment in appropriate renewable energy and/or clean firming to meet this consumption.

Although the renewable energy used to create LRET/SRES certificates is generally regarded to be emissions-free, translating renewable energy generation into impacts on Scope 2 emissions from electricity use is complex. The department proposes that the REGO can facilitate a market-based approach to Scope 2 emissions accounting. Under existing Scope 2 emissions accounting practices, annual average emissions intensity factors are used, and a market-based approach can allow renewable energy to be allocated to a load from a different region. However, the emissions intensity of the grid varies not only with location but also with time. The locational impact can be significant. For example, in Australia, the maximum average daily emissions intensity of the grid in 2021 varied from 0.022 tCO<sub>2</sub>-e/MWh (Tasmania) to 1.0222 tCO<sub>2</sub>-e/MWh

(Victoria), and the minimum varied from 0.5341 tCO<sub>2</sub>-e/MWh (Victoria) to zero (Tasmania) (AEMO, 2021). The impact of timing can be just as significant. A recent analysis of current carbon accounting standards suggests that RE PPAs that claim to cover 100% of emissions actually cover only 40-70% due to temporal mismatches between RE supply and demand (McKinsey & Co, 2022). Again, in Australia, where there is significant uptake of solar generation, the emissions intensity of the grid varies significantly over the day, which makes claims of emissions reductions based on a daily average increasingly inaccurate. Revision of scope 2 emissions accounting is under discussion including by the UN Clean Energy Compact, recommending temporal and locational tracking, and REGOs should be designed appropriately for this purpose.

It is important to note that beyond the RET<sup>8</sup> there is an absence of alternative government schemes or frameworks to certify the origination or characteristics of electrical energy consumed in Australia. It is thus unsurprising that many of the voluntary schemes developed for tracking renewable energy purchases have done so using the LRET certificates and registry. It is important to note too that the design of these voluntary schemes have come about as a result of the design of the LRET. While change will be necessary, with the sunset of the RET in 2030, any replacement scheme will need to be compatible with the LRET/SRES certificate structure to allow voluntary schemes to transition smoothly beyond 2030.

While acceptance of REGOs by alternative schemes (for instance, ClimateActive, GreenPower) is not confirmed at this point, in the absence of an alternative rigorous and widely adopted framework for renewable electricity certification, they will likely be reliant on the new framework delivered by the Australian Government. It should ideally be noted as part of the framework's policy documentation, that any federally supported program will accept REGOs. As the discussion paper notes, the use of one certification scheme as a basis for policy implementation or voluntary schemes is desirable because it reduces the risk of duplicate certificates (double counting). The REGO should include certificate attributes to accommodate key current and future accounting objectives. For instance, if a scheme has a fundamental objective of additionality, then this will drive certain metadata requirements for a REGO to be able to support this (for example, build date of a generator).

## Purposes and principles

Although DCCEEW recognises the importance of the REGO for decarbonisation of the Australian electricity sector and broader economy, much of the discussion in this section focuses on international harmonisation to facilitate certification of green hydrogen and other products, over the requirements to deliver a net-zero national economy by 2050.

“The objective of introducing a new renewable electricity certificate framework is to provide an enduring mechanism for the tracking, verification and trade of all renewable electricity generation in Australia.”

Robust tracking, verification and additionality of renewable energy generation and abatement and therefore its trading, requires alignment with the tracking, verifying and trading of electricity more broadly within the Australian context. To this end, the Australian Energy Market Operator (AEMO) has adopted a five minute market settlement process to reduce the operational and market distortions evident with the previous hybrid 5/30 minute dispatch and settlement.

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<sup>8</sup> Large-scale Renewable Energy Target – <https://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target/How-the-scheme-works/Large-scale-Renewable-Energy-Target>

# Design

## Policy position proposal 1

The Department proposes to develop and implement an enduring tradeable renewable electricity certificate mechanism administered by the Clean Energy Regulator.

### Response

We are supportive of the Australian Government leading development of trusted services for certification to be regulated by the CER, building upon their existing capabilities built through administering the RET scheme. It is important to note, however, in the interests of good governance (suitable scrutiny and accountability) that there should be a clear separation between the operator of the certification and trading services, and the regulatory body that oversees it. Good governance is crucial to maintaining trust in the integrity of certification schemes. Indeed, the recent CCA review of the ERF recommended increased transparency and stakeholder participation.

As such, we question whether the Clean Energy Regulator (CER) would be the most appropriate administrator of the certification and trading capability for the Australian Government, and instead would propose a separate government entity be responsible for building and operating the GO/REGO registries, with the CER continuing in its role as a regulator.

## Policy position proposal 2

The Department proposes to allow renewable electricity generation to create REGOs where that generation has not already created LGCs, STCs (unless the certificate creation period has passed) or other certificates.

### Response

We disagree with the “mutual exclusivity” approach outlined in policy position proposal 2. We will discuss this with respect to the two key programs the REGO seeks to replace at their completion of operation – the Large-scale Renewable Energy Target (LRET) Large-scale Generation Certificate (LGC) and the Small-scale Renewable Energy Scheme (SRES) Small-scale Technology Certificate (STC).

### The LRET, LGCs and REGOs

We believe “mutual exclusivity” is unnecessary, and could create significant issues during the interim period where LGCs and REGOs are proposed to co-exist. It has been proven viable to uniquely assign timestamped “granular certificates” (GC) uniquely to RECs in a number of demonstrations of the *EnergyTag* standard, including our trial being conducted under the *RACE for 2030 CRC – 24/7 TRUZERO* project in Australia. Users of these GCs are required to jointly surrender both the appropriate GCs and the equivalent RECs when making a time-matched renewable energy claim. This strategy of joint surrender for LGC linked REGOs prevents double counting, the key intent of policy position proposal 2.

Notwithstanding policy proposal 9 (that LGCs be permitted to voluntarily include attributes of REGOs), the proposed mutual exclusivity approach is likely to make REGO attributes difficult to access for consumers who procure LGCs, which they may be required to surrender under government or voluntary schemes. Suitably designed REGOs provide a superior certification by including time and location (same grid) matching, which may well be required by international bodies.



Adopting the “mutual exclusivity” approach as outlined in the discussion paper also introduces complications and unintended consequences for the operation and functioning of the LGC market. Specifically, the increased supply in Government accredited renewable certificates resulting from the inclusion of generation can be expected to result in lower prices across REGO and, consequently, LGC certificate markets (this is discussed further in response to policy proposal 6). This is a once in a generation opportunity to reform renewable electricity certification from a scheme designed to rather bluntly incentivise new renewable generation capacity, to one that can facilitate a range of more targeted policy-driven and voluntary decarbonisation efforts and harmonisation with international schemes, some of which will almost certainly require accurate temporal and spatial tracking of renewable energy generation. It will be critical not to undermine the perception of the quality of REGOs or create unnecessary complexity during the transition phase.

## The SRES STCs and REGOs

We note that all STCs basically expire on or before 2030. REGOs are positioned as the logical replacement for measurement of small-scale renewable generation. Section 4.1 states “...*systems that have created STCs under the RET would only be eligible to create REGOs once the maximum deeming period for which certificates were created...*”. Therefore, the REGO scheme needs to cater for renewable certification right down to household rooftop PV level. The proposed 1MWh / 1h REGO size presents challenges for these generators as a 5kW household system would take many weeks to meet the proposed conditions to create a single certificate. Further, the use of “carry-over” to create the REGO would allocate a single timestamp at the end of this period to electricity generated at different times and on different dates. The proposed REGO design would not allow generation to be temporally matched with consumption and, therefore, would not be a suitable successor for STCs. To resolve this, and in keeping with world best-practice, we would recommend adopting a variable volume/fixed time period REGO structure. We explore this more in our response to policy position proposal 12.

## Policy position proposal 3

The Department proposes to allow eligible renewable energy sources as defined under the Renewable Energy (Electricity) Act 2000 to create REGOs.

### Response

We agree in part with the Department’s policy position proposal 3. We note that this may not be an exhaustive set of sources that could be used for the creation of REGOs, including storage and offshore generation, in which case, policy position proposals 4 and 5 should be considered as additional requirements.

However, we believe that the ability to create REGOs should not exclude secondary energy sources. Hydrogen, for example, is a key option for storage of renewable electricity for use at other times. Assuming that REGOs are surrendered to demonstrate that the stored energy came from a renewable energy generator, as proposed in policy position proposal 4, they should not be prevented from creating REGOs when electricity generation occurs using that stored energy. We would seek an expanded list or more detailed definition of “*secondary energy sources derived from renewable energy*” before being able to provide further stakeholder feedback on whether further sources should be eligible to create REGOs.

The design of electricity provenance traceability into, and out of, energy storage is well advanced. The approach to storage, suggested under proposal 4 below, may be applicable to hydrogen and other ‘secondary renewable sources’. That is, certificates are surrendered when energy is stored or hydrogen is created, and new certificates are created when the storage is discharged, or hydrogen is used for generation. Timestamping would need to apply to both transactions to ensure that the value of shifting renewable generation over time can be monetised in the REGO market and renewable resources are incentivised to “*fill the gaps*” in intermittent renewable electricity production. As with storage, the original generation source

should be recorded on a H2GO and the subsequent secondary generation REGO to facilitate matching of consumption with clean generation, and losses through the hydrogen generation and discharge process will need to be accounted for.

## Policy position proposal 4

The Department proposes to allow storage facilities to create REGOs for electricity dispatched if they demonstrate that the stored energy came from eligible renewable electricity generation by first surrendering an appropriate REGO or LGC.

### Response

We agree in part with the Department's policy position proposal 4. We believe that there should be a requirement that, for a storage facility to create a REGO, a matched REGO for the energy stored should be surrendered and the storage certificate be linked to the surrendered generation REGO, therefore retaining all of the original information. To facilitate storage REGOs that reflect time-matched renewable energy, the surrendered REGOs used to create storage REGOs should be time-matched with consumption by the storage. This would avoid a situation where the storage facility charges from a non-renewable grid mix, separately buys cheap REGOs that do not match time of charging, and then sells as a time-matched REGO. Certificates for green firming energy would attract a premium, thereby delivering the market price signals needed to help balance the grid with carbon-free energy source 24/7. Correct timestamping of REGOs is critical to avoiding market distortions and driving the required investments.

Further, some storage (for example, pumped hydro) will require specific rulings on managing the difference between energy in storage through consumption of grid energy, versus energy in storage through another mechanism (for example, pumped hydro that also has traditional water flow to the storage). Losses through the storage technology will also need to be accounted for.

## Policy position proposal 5

The Department proposes that electricity generated by offshore renewable energy power stations and storage facilities located within coastal waters of states and territories, the territorial sea of Australia, and Australia's Exclusive Economic Zone, and electricity that is exported internationally, be eligible to create REGOs.

### Response

We agree with the Department's policy position proposal 5.

## Policy position proposal 6

The Department proposes to allow all renewable electricity generation to create REGOs regardless of power station age.

### Response

We acknowledge the intent of the Department's policy position proposal 6 is to broaden the scheme beyond certificates required to support the RET's aim to drive additional renewable investment, in order to accommodate consumers wishing to comply with different schemes and goals. While we recognise the importance of facilitating opportunities for the export of green products such as green hydrogen, we are concerned that removing additionality requirements raises the following issues:

- Lack of an additionality principle reduces the quality of the certificates in the market. In general non-sophisticated consumers may not be able to differentiate between generation sources or certificates with recent vs long past project commissioning dates, leaving the door open to “greenwashing”.
- The additional supply of Government accredited renewable energy certificates would lower prices and undermine investment in new renewable generation.
- To date, discussions around certification schemes in the EU and US indicate that additionality requirements are likely to be more stringent, not less stringent than existing RET requirements.
- While soft additionality principles may reduce costs for large consumers of renewable energy (exporters of green products or commercial customers who have sufficient scale to sign PPAs), this does not assist investment in new energy infrastructure and would push the costs of necessary electricity industry transition to achieve net zero by 2050 onto remaining energy consumers/taxpayers.

The proposed new REGO certificates include expanded eligibility criteria, that allows the inclusion of legacy hydro and biomass facilities. This would result in approximately 14,600GWh of additional generation eligible to create REGO certificates.

This represents an increase in the overall supply of Government accredited renewable energy certificates. As the discussion paper acknowledges, this would provide “lower cost options” for consumers that may wish to voluntarily purchase certificates. A direct consequence of this is lower voluntary demand for Large-Scale Generation certificates, and lower prices than might otherwise be the case. While this doesn’t prevent policy makers and energy consumers applying more specific requirements such as additionality, it does particularly risk confusing less informed energy consumers. This could undermine the function of the LGC market in driving the necessary investment in new renewable energy capacity. In addition, the value ascribed to REGO certificates also represents a windfall financial gain for the previously ineligible generation.

## Policy position proposal 7

The Department proposes to allow all renewable electricity generation to create REGOs regardless of power station or storage facility capacity.

### Response

We agree strongly with the Department’s policy position proposal 7. The design choice to allow any size generation plant is critical to the viability of REGOs. However this is incompatible with the choice of 1MWh fixed certificate size and hourly timestamps, as we outline in our response to policy position proposal 12 below. We would like to highlight the need for the REGO to cater for small scale generation technology, with the SRES also finishing in 2030.

## Policy position proposal 8

The Department proposes to require REGOs include all the information currently displayed on LGCs, and that this information be publicly visible.

### Response

We agree in part with the Department’s policy position proposal 8. The required metadata for LGCs should be considered a subset of that required for a REGO, however the REGO has also been positioned as a replacement for the STC. Given the inclusion of STCs in the discussion, it should be noted that the requirements for a REGO from a smaller generator (for example, residential solar) may necessarily be different from the approach adopted for LGCs, and data privacy requirements may also need to be applied.

We note that the current proposal paper has not included a field that specifically identifies the power station/storage facility that is the source of the generation. LRETs include the field “Power station accreditation code”, which could be used to link REGOs directly to a power station, whereas Figure 4 only

includes “Renewable energy source or storage technology”. It seems that this field refers to the technology type rather than the specific generator. More detailed provenance relating to the specific power station or storage facility may be important to some consumers e.g. for detailed emissions attribution, accounting for transmission losses or to facilitate time-matched PPA contracts with a specific generation/storage portfolio. We should be seeking greater rather than less transparency to facilitate targeted policy support mechanisms and consumer engagement in their preferred electricity supply arrangements.

## Policy position proposal 9

The Department proposes to allow RET participants to choose to include on LGCs some or all of the additional information required on REGOs.

### Response

We agree in part with the Department’s policy position proposal 9. The inclusion of REGO information on an LGC will facilitate its use in other schemes that might require REGO attributes. However, we note that, if LGCs are augmented with both location and timestamp information, then the problems highlighted in our response regarding REGOs sizing would also apply to such timestamped LGCs.

## Policy position proposal 10

The Department proposes to require REGOs include the commissioning date of the power station or storage facility creating the certificates.

### Response

We agree in part with the Department’s policy position proposal 10. This is an appropriate approach for participants seeking to drive additionality while preserving the REGO scheme as an accurate fully inclusive renewable electricity measurement system. However, we would like to reiterate our broader concerns around lack of minimum additionality criteria for REGO creation (see our response to policy position 6).

We would also like to note that renewable energy generators, unlike many of the conventional fossil fuel generators, are more modular in project construction, deployment and operation. As such there is likely a need to handle the case of expansion, or of gradual commissioning, of individual renewable energy generators behind a single aggregated connection point (such as a wind farm, or solar farm).

## Policy position proposal 11

The Department proposes to require REGOs to include the grid location of the power station or storage facility creating the certificates.

### Response

We agree with the Department’s policy position proposal 11. The design decision to capture the location, both geographical and topological (“grid location”) in which the electricity was generated, rather than a lower level grid location is a pragmatic approach balancing the needs of auditability of certificates against the complexity of the topological arrangement of the grid.

It is important that energy be generated on the same grid to maintain the credibility of renewable provenance claims. But there are significant complexities and implementation challenges to any more granular detail such as taking into account grid interconnector congestion. While there have been extended periods when the Basslink Interconnector across Bass Strait was out of service, we note that special consideration for any one

interconnection may raise further complications. As mentioned above, data privacy considerations might also require restrictions on the granularity of the locational data included on REGOs for small-scale generators.

## Policy position proposal 12

The Department proposes that REGOs created by power stations and storage facilities over 1 MW in capacity be required to include a timestamp reflecting the hour in which the electricity was dispatched by the power station or storage facility.

### Response

We strongly agree with the need to include timestamping of REGOs, to ensure that value is placed not only on the provenance as renewable electricity, but also the point in time, and location, of that renewable electricity. We therefore generally agree with proposal 12 that time stamping be mandatory *at least* for larger facilities, but note that the timestamp attribute should also be available for any facility, regardless of size. However, the choice of a 1MWh fixed volume for certificates constrains temporal matching of generation and load and greater granularity is preferable to track the time of generation.

We strongly disagree that a “carry-over” approach, which would be necessary for 1MWh fixed volume certificates, is either required or desirable. The introduction of any “carry-over” action seems to violate the very principle of timestamping or, at least, introduces avoidable inaccuracies and complexity.

Many renewable power stations and storage facilities are highly variable in output, and even large generators are to be found generating at small percentages of their capacity during some time periods. “The use of carry-over” is therefore likely to be the rule rather than the exception, and there are many circumstances where cumulative carry-over will result in large inaccuracies in the time stamp. Even a solar generator of many MW capacity produces a partial MWh in the last hour of daylight that would be carried-over to the following morning and time-stamped the next day. Consider that for 100kW PV generators (currently eligible for LGCs) it will take ~2 days to produce a 1 MWh certificate even in sunny conditions. So every day it is probable that hundreds of kilowatt hours will need to roll into the following day, and if it is cloudy, this energy may be shifted even further from the originating point in time. The extent of carry-over increases as the power output of “power stations and storage facilities” reduces, so for small generators, each certificate then becomes increasingly time-shifted. This unnecessarily discriminates against small generation providers and small consumers wishing to sell or procure load-matched renewable energy.

We agree that “power stations and storage facilities” over 1 MW in capacity should be required to timestamp their certificates, and we wish to ensure that in implementing this policy position proposal that facilities less than or equal to 1 MW in capacity are not inhibited from timestamping their certificates. Use of a 1MWh fixed volume certificate with “carry over” is unnecessary and may limit the value available to smaller generators by forcing them into aggregation schemes. More generally, the carry-over would need to be applied to every generator every hour, increasing scheme complexity rather than reducing it, and further distorting the actual operation of the certification system.

To avoid the need for “carry-over”, a higher level of granularity is required. The time stamp on a certificate will then accurately align with the actual time of generation. This can be achieved through use of smaller fixed-volume certificates or variable volume certificates.

The approach adopted by 12 EnergyTag demonstration projects undertaken to date in Europe, Australia, and the USA is variable volume certificates with a granularity of 1Wh. Variable-volume REGOs could be “*splitable*” to allow for a customer to partially consume the energy generated in a particular time period. (We point to the capabilities of existing systems already in commercial usage to manage this process, such as Enosi’s Powertracer, and registries already trialling EnergyTag certificates such as MRETs and I-REC.) An alternative

approach would be to combine 1Wh fixed-volume certificates in batches of variable size, with the batches able to be split while maintaining the integrity of individual certificates.

The first version of EnergyTag<sup>9</sup>'s proposed International Standard for Granular Certificates supports either 1Wh fixed volume certificates and variable volume certificates, sensibly seeking to benefit from practical experience before standardising this issue. Each of these approaches has advantages and disadvantages, but they all provide the volume granularity necessary to ensure accurate timestamping and avoid disadvantaging small generators. Our preferred approach is variable volume certificates, of which there is growing experience through the EnergyTag participating trials.

The world of big data processing has progressed significantly in the more than two decades since the introduction of the LRET. Further, services already exist that provide for the provenance of individual small generation sources to be assigned, certified and matched to consumption across the grid.

In addition to adopting one of the above approaches to maintain granularity, we recommend aligning the REGO with the AEMO's settlement period of five minutes, instead of the 60 minutes proposed. While we accept that timestamping at 60 minutes would align with many of the international 24/7 carbon-free energy efforts being undertaken, alignment with the existing market settlement periods would prevent "time-shifting" of REGO certificates to claim renewable energy generation in incorrect dispatch/settlement periods within electricity market. If required (for example, for export purposes or to align with other reporting requirements) the five minute interval based REGOs could be readily aggregated into 1 hour units. Further to this, the adoption of five minute interval over 60 minute interval for the REGO ensures that the non-hour based time zones (for example, Australian Central Standard Time) aren't placed in an odd position when it comes to the REGO creation/surrender (30 minute offset on the 60 minute interval) or have to adopt a different time zone (non-hour based).

We disagree with the assertion that the provision of high resolution data would be challenging. Almost every small generator in Australia has a Financially Responsible Market Participant (FRMP) in the NEM or WEM and a Meter Data Provider (MDP) assigned to measure and report their grid exports based on smart metering data collected daily. This data is available to AEMO, the distribution network operator, the customer's Retailer, and of course under consumer data rights, to the small generator. Retailers, aggregators and other service providers can readily establish such granular data services. Moreover any post-2030 REGO scheme should be designed with current and emerging measurement, metering and data technology in mind.

These interconnected issues (generation size eligibility, hourly time stamping, certificate size) are solved by adopting high granularity certificates, such as the variable volume/settlement-interval timestamp approach favoured by the EnergyTag standard. And already proven in multiple trials.

## Policy position proposal 13

The Department proposes to require REGOs to include information indicating whether the certificate was created for generation exported overseas, or for electricity dispatched from a storage facility.

### Response

We disagree with the Department's policy position proposal 13. We believe that the rationale is unclear. At the point of generation it may be unknown whether or not the renewable electricity generation should be earmarked prior as "for export". Except in isolated systems (none of which yet exist) where the only possible use is overseas, the point at which a REGO can be marked as "for export" would be at the point of matching the generation with consumption.

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<sup>9</sup> EnergyTag <https://energytag.org/>

This issue does raise a requirement for physical matching that exported energy from renewable electricity sources may need. It may be simpler to consider that if and when international interconnectors are built, then the location stamp of the generation will be amended to provide that context. This once again highlights the need for a flexible metadata system to be adopted as part of the framework to support possible future adaptations of the REGO framework.

## Policy position proposal 14

The Department proposes that anyone may surrender a REGO at any time, including for the purpose of creating a product Guarantee of Origin certificate.

### Response

We broadly agree with the Department's policy position proposal 14. The approach that anyone may surrender a REGO at any time creates flexibility for innovation in services and use of REGOs by consumers seeking proof of provenance for renewable electricity. We note this indicates accredited third parties will provide time and location matching services, not the agency responsible for the operation of the framework.

## Policy position proposal 15

The Department proposes that the Clean Energy Regulator develop systems and processes to facilitate the voluntary matching of certificates based on time or other energy attributes.

### Response

We agree in principle that an agency of the government should develop a framework to facilitate matching of certificates as described in policy position proposal 15. However, since the CER has the role of regulator, we advocate that another agency, separate from this regulatory function, act as the administrator of the framework.

The agency responsible for the administration of the framework should certainly be tasked with the development and operation of systems and processes to facilitate matching of certificates based on time or other energy attributes. However, we argue that it should be possible for third party organisations to be accredited to deliver the matching services themselves on behalf of energy buyers and sellers. These services can be integrated via standardised application programming interfaces (APIs) with systems developed by the framework administrator. In this way the agency responsible need not develop the matching capabilities themselves, but rather draw upon the capabilities of accredited third parties to deliver these services.

A suitable approach for the agency would be to operate the registry, while accredited third party organisations deliver matching services for energy buyers (consumers or storage facilities) seeking to acquire and surrender timestamped REGOs and LGCs that match their actual consumption profiles.

## Policy position proposal 16

The Department proposes to require REGOs to include the name of the person or organisation on whose behalf the REGO is being surrendered, where applicable, and if the surrender is being made on behalf of many organisations.

## Response

We broadly agree with the Department's policy position proposal 16. We would extend this, however, in order to better support matching services. As such, we recommend the registry should include identification of the consumption point NMI against which the REGO has been matched.

We would like to note that electricity retailers could, if suitably equipped, match REGOs on a *many to many* basis, and provide a service to GreenPower customers that identifies their time and location matched energy. This is a desirable step in the evolution of all voluntary schemes – not just 24/7 corporate PPAs. Corporate PPA and GreenPower customers alike could then be incentivised to shift demand to hours of renewable production.

The transparency regarding the surrendering entity is a highly desirable outcome. Nevertheless, some data privacy processes will of course be required. This is particularly so with respect to information from which the customer's load profile may be determined. There may be steps put in place to manage this for mass market (that is, residential and small business) customers in particular.

## Policy position proposal 17

The Department proposes that additional information capturing the purpose of the REGO surrender be required to be provided when a person or organisation surrenders a REGO, and be publicly visible.

## Response

We broadly agree with the Department's policy position proposal 17. Clarity in the public domain as to the justification for surrender of a REGO should be considered a key deliverable of a framework intended to deliver trust in its operation. This same approach should be considered from an end-to-end perspective – the independent auditability of participants and the broader public should be considered a key capability the framework delivers. This would ensure that, where participants delegate responsibility for sourcing REGOs (for example, to their retailer under a GreenPower contract), they have the ability to independently check the delivered products and services.



# Implementation

## 5.1 Legislated frameworks and administration

### Registration of Consumers

While registration of registry participants is simple, validating claims of certificate surrender will be significantly more complex when time/location matching of energy consumption is also claimed.

For this reason it is suggested that accredited third party agents are enabled in the design to perform such services. This would involve access via a suitable APIs to the REGO data, and to AEMO's meter data stream records for consumption data which in turn would be authorized under consumer data access provisions.

## 5.2 Implications for the RET and other schemes

### Mutual exclusivity between LGCs and REGOs

As discussed elsewhere, the design of time/location based granular certificate schemes in Europe, USA and under the RACE for 2030 24/7 TRUZERO project has dealt with this differently.

In all other cases where a new 'granular certificate' GC is proposed to operate in parallel with a legacy REC scheme, the solution has been to uniquely allocate GCs to one or more RECs. To avoid double counting, consumers are required to surrender both the RECs and the matched GCs that apply to their load if they wish to make a time/location matched claim.

### Adding time-stamps to LGCs

While this would solve the problem of mutual exclusivity restricting access to time attributes for LGC users, under the current 1MWh LGC structure adding a time stamp would attract the same issues described for 1MWh REGOs.

- When generation falls below 1MW output, the timestamp would have to roll-over and become inaccurate. This would happen almost every day as the sun rises and sets / wind rises and falls. Sunset in particular would cause roll-overs to the following day.
- Smaller generators <1MW would never get an accurate timestamp (noting there are many LGC eligible generators between 100kW and 5MW).

Again we suggest a better solution is to allow variable volume, time-stamped REGOs and LGCs to represent the same energy, with REGO's uniquely assigned to LGCs. An attribute of a REGO would be the LGCs that are surrendered at the same time (if any) - noting below baseline generation REGOs would not have or require a matching LGC.

End.