Energy Security Safeguard
Office of Energy and Climate Change

Energy Savings Scheme

2022 Rule Change

Public Consultation Forum

October 2022

NSW GOVERNMENT

Acknowledgement of Country

We acknowledge that today we meet on many Aboriginal lands.

We acknowledge the traditional custodians of the lands and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work.

Nikita Ridgeway

Agenda

9.30	Acknowledgement of Country	David Pryor
9:35	Background and general changes	Aarushi Kochhar
9:40	Fuel switching	Rod Boyd
10:00	Changes to PIAM&V, MBM and PIAM	Ahmed Alabadla
10:20	Next steps	Aarushi Kochhar
10:30	Q&A	
11:00	Session closes	

Background

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The Energy Security Safeguard

The Energy Security Safeguard is part of the *NSW Electricity Strategy*, the government's plan for a reliable, affordable and sustainable electricity system. The Safeguard includes two schemes:

- The existing **Energy Savings Scheme (ESS)** creating a market and financial incentives to help households and businesses save energy and reduce energy bills. The scheme has been extended to 2050. It will have an expanded set of eligible activities, and energy savings targets will gradually increase to 13% by 2030
- A new **Peak Demand Reduction Scheme (PDRS)** supporting activities that provide the capacity to reduce demand at peak times.

The Energy Savings Scheme

NSW's largest energy efficiency program

32,500

GWh

Energy savings till 2029

$6.1

Billion

Energy bill savings till 2029

39.6

Million

ESCs created from 2009 to July 2021

Why update the ESS Rule?

- Update existing methods to align with changes to GEMS Determinations, standards and the underlying programs
- Incorporate stakeholder feedback and evaluation results
- Maintain the effectiveness of the ESS Rule through updates to savings factors, changes to the Rule requirements and adding activity schedules for new technologies
- Make other enhancements to the ESS Rule to maintain its integrity and/or reduce transaction costs

General changes to Rule

- Structural Review of Clauses 1- 6
- Inclusion of fuel switching

Structural Review of Clauses 1 - 6

Structural review undertaken to:

- Improve wording
- Ensure Rule is simple and clear, concise and consistent

Clause	Subject	Changes
1	Name & commencement	No changes
2	Objects of the Rule	Compete rewrite – now simpler
3	Application of the Rule	No changes
4	Status and Operation	No changes
5	RESA, eligibility	Significant changes to 5.3 and 5.4 to define bounds of Rule
6	Creation of ESC	New Equation 1; Certificate Conversion factors
10	Definitions	New definitions introduced to support the new fuels
Schedule A		New Table A.27 GHG emissions factors

Overview of general changes to Rule

Significant changes to clauses:

- 2.1 Object: complete rewrite (now simpler)
- 5.3, 5.4: changes to define bounds of Rule
- 6: New Equation 1; Fuel conversion factors

7 & 8 (for PIAM&V, PIAM and MBM):

- Treatment of additional fuels
- Terminology & consistency

- 10: New definition of fuels
- new Table A.27 (GHG factors)

Fuel switching

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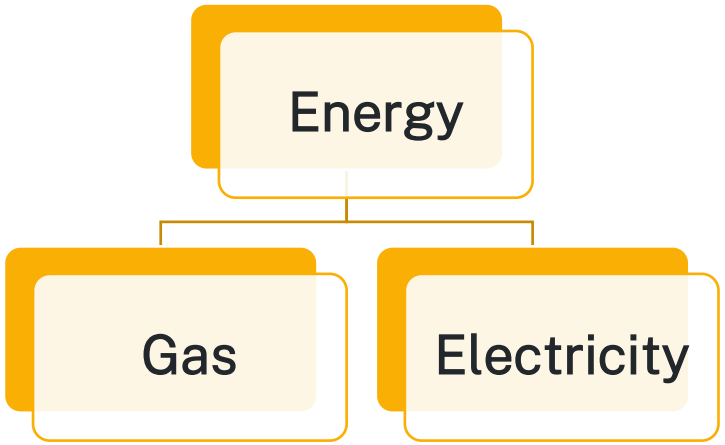
Inclusion of fuel switching

- A key element of the NSW Electricity Strategy is expansion of the ESS to include broader range of activities.
- These of activities will reduce demand on electricity and gas networks.
- ESS will be expanded to include fuel switching activities

This will include switching from:

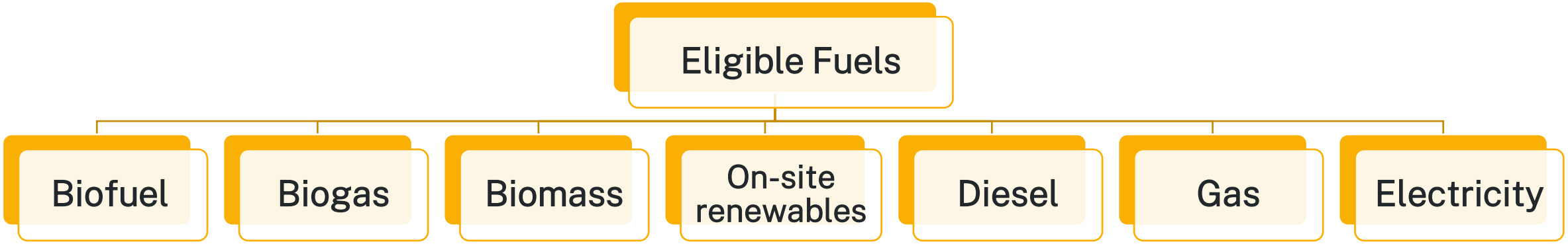
- Grid connected gas or electricity to bioenergy, solar thermal or other alternatives
- Non-grid connected energy, such as stationary use diesel, to an affordable alternative.

Eligible fuels – current Rule



- *Current rule refers to Gas, electricity and at times collectively as ‘energy’*
- *Permits switching from electricity to gas or gas to electricity*

Eligible fuels – new Rule



- *Five new fuels in addition to Gas and electricity*
- *Concept of 'Eligible Fuel' defined*
- *For the purpose of this Rule, electricity is referred to as a type of fuel*
- *Introduced in s2.3.3 of Consultation Paper*

Eligible fuels

The most significant changes proposed will be:

- *The inclusion of the range of new fuels*
- *ESC creation by switching between these fuels and improving end use efficiency of these fuels.*

Fuel switching activities that reduce the use of **non-renewable primary energy**† will be eligible for the creation of ESCs.

Fuel	Certificate conversion factor
Electricity	1.06
Gas	0.47
Diesel	0.47
Biofuel	0.21
Biogas	0.17
Biomass	0.08
On-site Renewables	0

[† ***Non-renewable primary energy*** *includes energy derived from sources that exist in limited quantities and cannot be replaced after they have all been used. Includes coal, oil, gas and nuclear fuels*].

Calculation of ESCs

New equation 1:

$$Number\ of\ Certificates = \sum implementations \left[\begin{array}{r} Electricity\ Savings \times Regional\ Network\ Factor \times Electricity\ Certificate\ Conversion\ Factor \\ + Gas\ Savings \times Gas\ Certificate\ Conversion\ Factor \\ + Diesel\ Savings \times Diesel\ Certificate\ Conversion\ Factor \\ + Biofuel\ Savings \times Biofuel\ Certificate\ Conversion\ Factor \\ + Biogas\ Savings \times Biogas\ Certificate\ Conversion\ Factor \\ + Biomass\ Savings \times Biomass\ Certificate\ Conversion\ Factor \\ + On \cdot Site\ Renewables\ Savings \times On \cdot Site\ Renewables\ Certificate\ Conversion\ Factor \end{array} \right]$$

- For fuel switching activities, either Electricity Savings, Gas Savings, Diesel Savings, Biofuel Savings, Biogas Savings, Biomass Savings and On-site Renewables Savings or Electricity Savings may be negative.
- Energy Savings Certificates may only be created where the result of Equation 1 is a positive number.

Proposed definitions

Gas	Means natural gas or liquefied petroleum gas (LPG)
Biomass	Means organic matter other than fossilised biomass. The following types of Biomass are eligible under this Rule: a) Biomass from Agriculture b) Forestry and Sawmilling Residues c) Uncontaminated Wood Waste d) Organic Residues from Virgin Paper Pulp Activities e) Energy Crops
Biofuel	Means a liquid fuel derived or recovered from organic matter, other than fossilised biomass. The following types of Biofuel are eligible under this Rule: a) Biodiesel b) Ethanol c) Recovered Waste Vegetable Oil
Biogas	A gaseous fuel derived or recovered from Biomass
Bioenergy	Energy generated from the Biofuel, Biogas or Biomass components of a fuel.

Proposed definitions

On-site Renewables	Means energy generated on the Site where an Implementation takes place only using one or more of the following energy sources:	
	• solar • wind • geothermal-aquifer • hot dry rock	• hydro • wave • tide • ocean
Native Forest Bio-materials	Has the same meaning given to that term in the *NSW Protection of the Environment Operations (General) Regulation 2009 .*	
Energy Crops*	Means crops that are specifically grown for Bioenergy generation. Biomass from a plantation is not an Energy Crop unless it meets all of the conditions under Part 2, Division 2.2, clause 9(1) of the *Renewable Energy (Electricity) Regulation 2001.*	

Possible fuel switches

ORIGINAL FUEL	NEW FUEL: Electricity	Natural gas	Diesel	Biomass	Biogas	Biofuel (liquid)	on-site renewables
Electricity		✗	✗	✓	✓	✓	✓
Natural gas	✓		✗	✓	✓	✓	✓
Diesel	✓	✓		✓	✓	✓	✓
Biomass	✗	✗	✗		✓	✓	✓
Biogas	✗	✗	✗	✓		✓	✓
Biofuel (liquid)	✗	✗	✗	✓	✓		✓
on-site renewables	✗	✗	✗	✗	✗	✗	

Possible fuel switches – project examples

ORIGINAL FUEL	NEW FUEL: Electricity	Natural gas	Diesel	Biomass	Biogas	Biofuel (liquid)	on-site renewables
Electricity		✗	✗	✓	✓	✓	✓
Natural gas	✓		✗	✓	✓	✓	✓
Diesel	✓	✓		✓	✓	✓	✓
Biomass	✗	✗	✗		✓	✓	✓
Biogas	✗	✗	✗	✓		✓	✓
Biofuel (liquid)	✗	✗	✗	✓	✓		✓
on-site renewables	✗	✗	✗	✗	✗	✗	

Fuel switch project example:
Cotton & wheat farm irrigation: diesel → solar PV

Scenario

- 2000Ha farm, central west NSW
- 12ML bore water pumped daily
- Annual diesel consumption 124,000 litres

Fuel switch

Installation of solar / diesel irrigation system

- 400kW solar PV (~900 panels over 0.8Ha)
- Hybrid electric / diesel pumps
- 5.6ML / day pumped by solar alone

Outcome

- 62,000 litres of diesel displaced annually by solar energy

Fuel switch project example:
Canola farm: diesel → biodiesel

Scenario

- 1000Ha canola farm
- Annual diesel usage 63,000litres

Fuel switch

Production of canola derived biofuel

- Oil yield 1250l/ Ha
- Construction of press
- 50Ha of crop devoted to on-farm use

Outcome

- 5% of canola crop enough for self-sufficiency in bio-diesel

Fuel switch project example:
Cement plant: natural gas → sawdust

Scenario

- Cement manufacturing producing 1.3 million tonnes cement products annually
- Facility uses 4.8PJ natural gas per year

Fuel switch

Retrofit of biomass co-firing system

- Combustion system modified for plant to partially utilise wood waste
- 70,000t of wood waste used each year
- Replaces 25% of natural gas feed

Outcome

- Annual gas savings 1.2 PJ (330,556 MWh)
- ESC creation: ~ 125,000 per year

https://arena.gov.au/assets/2019/11/renewable-energy-options-for-industrial-process-heat.pdf

Fuel switch project example:
Piggery: electricity & natural gas → biogas

Scenario

Piggery energy use:
- Electricity: *Ventilation, lighting, feed & manure handling*
- Natural gas: *Heating (weaners and piglets)*

Fuel switch

Installation of anaerobic digestor / biogas engine
- Waste gas collected from effluent ponds
- Gas used to power engine generator
- Waste heat from engine used for heating
- Electricity from generator used within piggery

Outcome
- Natural gas is displaced by waste heat from engine
- Imported power is displaced by on-site generation
- ESCs generated from both natural gas and electricity savings

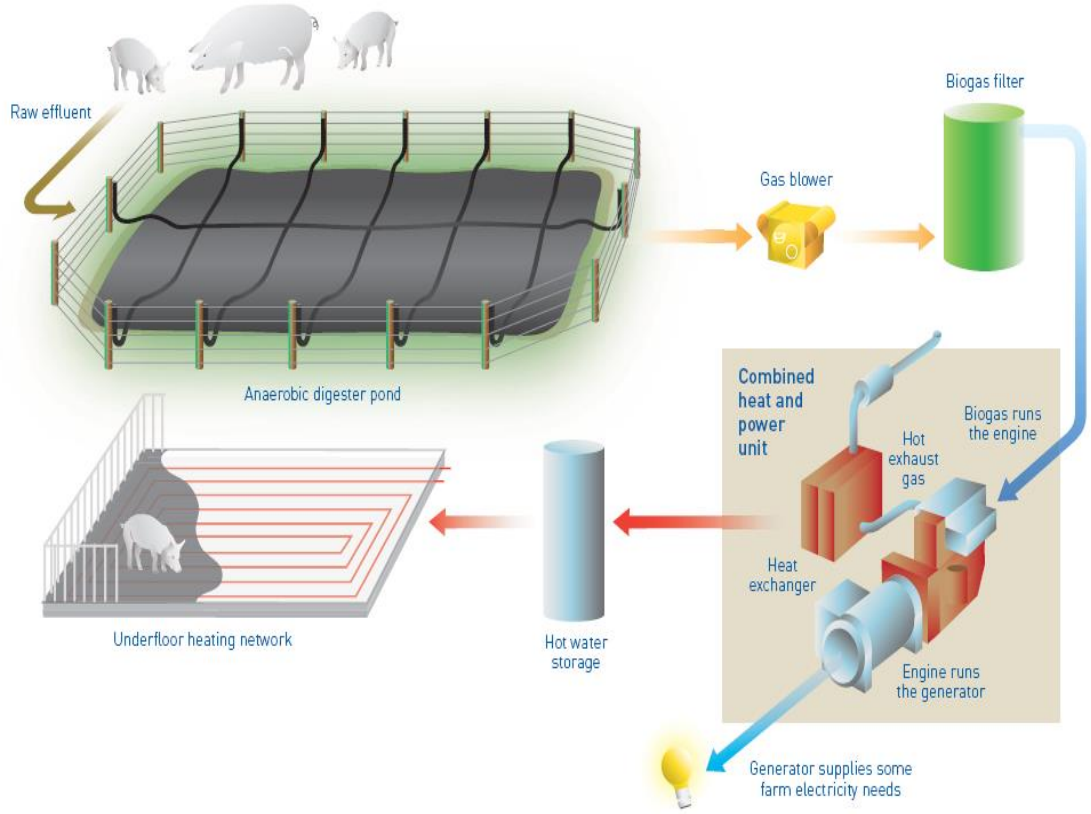
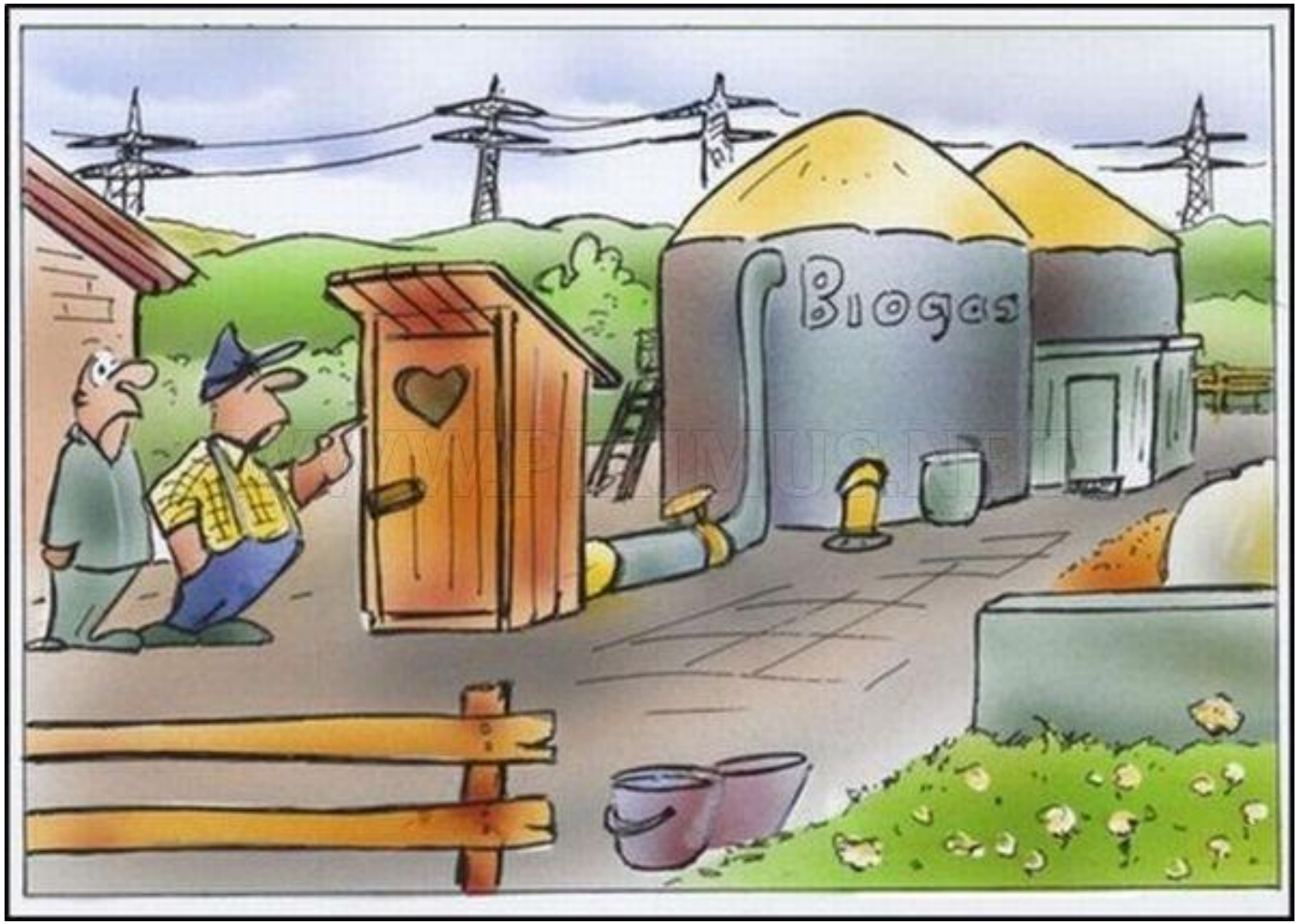


Diagram credit: National Institute of Water and Atmospheric Research, NZ


Biogas

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Changes to PIAM, MBM and PIAM&V

- Project Impact Assessment Method
- Metered Baseline Method
- Project Impact Assessment with Measurement and Verification

Changes to PIAM

Clause 7.1(e) of the draft ESS Rule

- PIAM Annual Creation does not have a date on which the savings are deemed to have occurred
- This can create issues with ESC vintage and the 30 June registration deadline

- This Rule change:
  - Provides clarity around the annual ESC creation process and ESC vintage
  - Proposes a specific date for the energy savings – the last date of the period for which the Energy Savings are calculated

Changes to MBM

Summary of MBM Rule changes

1. Clarification of Normalised Baseline Calculation Method	• Normalisation of the baseline should occur after each measurement period • Currently it can be interpreted that normalisation should only occur once
2. Clarification for determining subsequent baseline Measurement Periods	• Explanatory text clarifies how to 'bring forward' a baseline Measurement Period to calculate ongoing Energy Savings
3. Calculating Energy Savings from Fuel Switching	• Improves clarity of the requirement for calculating Energy Savings from fuel switching • Changes in consumption of all fuels must be calculated to ensure net Energy Savings are positive.

Changes to PIAM&V

Summary of PIAM&V Rule changes

PIAM&V Rule Changes
1. Non-Routine Events (NREs) and Non-Routine Adjustments (NRAs) (NRE-A Requirements)
2. Minimum statistical requirements
3. Application of the Effective Range (Equations 7A.2 and 7A.4)
4. Interactive Energy Effects/Savings
5. Meter calibration requirements
6. Updated and added definitions

Changes to PIAM&V

1. Non-Routine Events (NREs) and Non-Routine Adjustments (NRAs) (NRE-A Requirements)

The NRE/NRA Rule Change (Clause 7A.5B1)

- Provides more flexibility in managing NREs and NRAs
- Provides a mechanism to deduct Energy Savings from Other Implementations (e.g. deemed)

The NRE-A Requirements (Clause 7A.5B)

- Supplements and supports the new NRE/NRA Rule clause
- Provides clear guidance and methods on how to use the new NRE/NRA Rule clause

Changes to PIAM&V

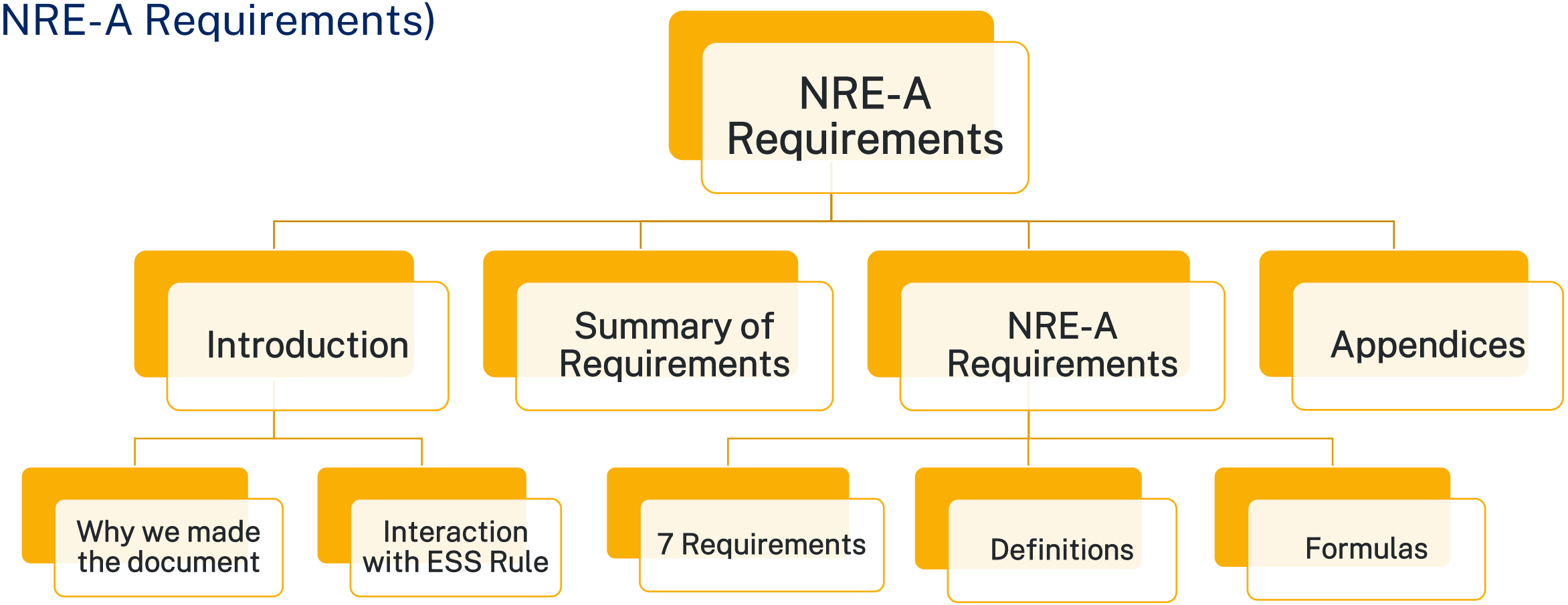
1. Non-Routine Events (NREs) and Non-Routine Adjustments (NRAs) (NRE-A Requirements)

Current Approach	New Approach
If NRE < 20% of the Measurement Period → Record and exclude	NRE → If sub-metered, record and use Sub-metering Method NRE → If not sub-metered, record and use → Other Implementations (OIMP) Estimate Method NRE → If not sub-metered, record and use → Data Exclusion Method NRE → If not sub-metered, record and use → Short Energy Models Method

Changes to PIAM&V

1. Non-Routine Events (NREs) and Non-Routine Adjustments (NRAs)

(NRE-A Requirements)



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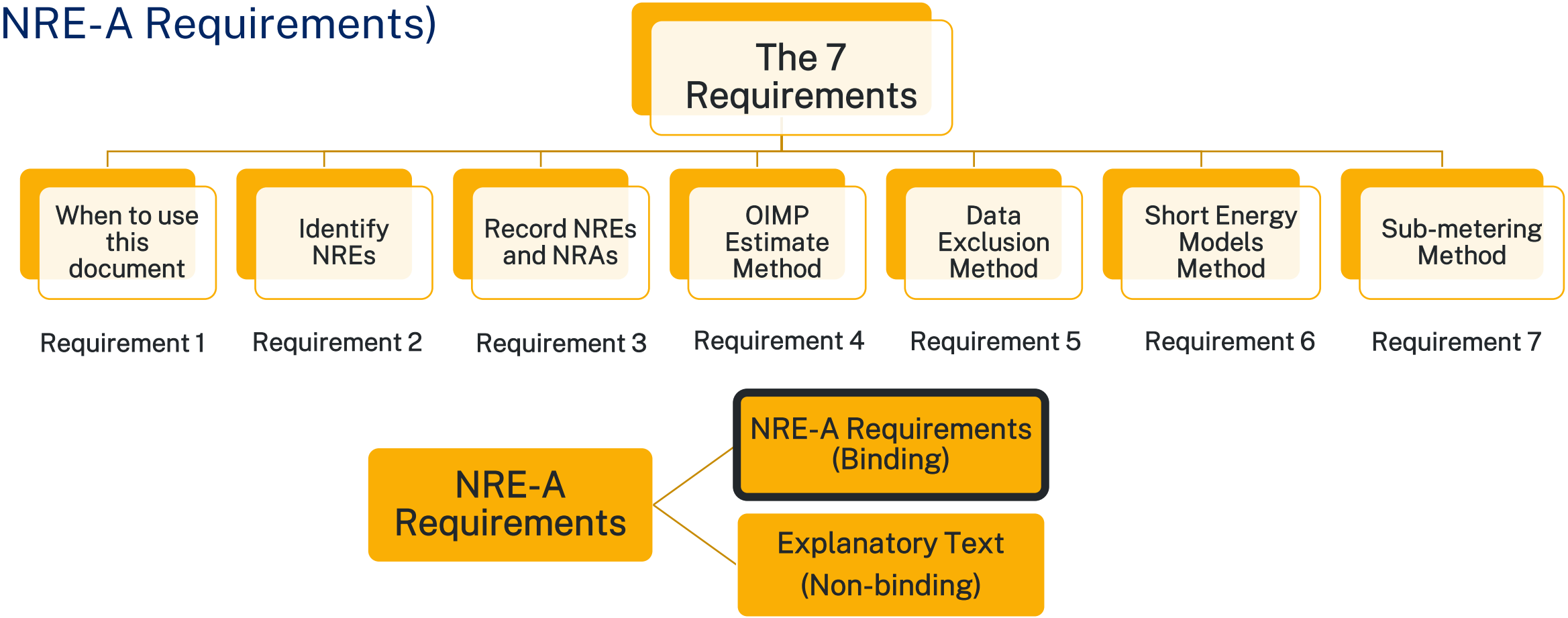
(NRE-A Requirements)



Changes to PIAM&V

2. Minimum statistical requirements

- Feedback from one stakeholder was that the requirement for Adjusted $R^2 > 0.5$ should be reconsidered as projects with lower Adjusted R^2 could still have good relative precision due to the large energy savings
  - ✓ We responded by allowing for projects with Adjusted R^2 less than 0.5 with a caveat

Changes to PIAM&V

2. Minimum statistical requirements

- Mandatory minimum statistical requirements (Table A22 in Schedule A)
  - ✓ If Adj. R^2 is above 0.5, then the maximum CV_{RMSE} value must not exceed 0.2
  - ✓ If Adj. R^2 is below 0.5, then the maximum CV_{RMSE} value must not exceed 0.1

Modelling Criteria	Requirement
T-statistic of Independent Variable	Absolute Value > 2
Adjusted R^2 (Adjusted Coefficient of Determination)	$CV_{RMSE} < 0.2$ for $R^2 > 0.5$ $CV_{RMSE} < 0.1$ for $R^2 < 0.5$
Coefficient of Variation of the Root Mean Square Error (CV_{RMSE})	

Changes to PIAM&V

3. Application of Effective Range (Equations 7A.2 and 7A.4)

Some stakeholders provided feedback that

- Independent Variables may routinely fall outside the Effective Range and should not constitute Non-Routine Events (noting that the Independent Variables are used to make routine adjustments)
- As part of Requirement 6, the discount factor of 3.5 used in calculating the Effective Range Adjustment Factor (ERAF) was too high and should be reduced

Changes to PIAM&V

3. Application of Effective Range (Equations 7A.2 and 7A.4)

We responded by

- Changing the way the Effective Range is used in the rule by allowing for the application of the ERAF
- Reducing the discount factor to 3.0

Changes to PIAM&V

3. Application of Effective Range (Equations 7A.2 and 7A.4)

This Rule change:

- Accounts for Energy Savings that correspond to Independent Variable values that fall outside the Effective Range, rather than excluding them
- Introduces a similar approach to that used in the Short Energy Models NRA Method

$$\boldsymbol{ERAF = 1 - |3.0 * POER|}$$

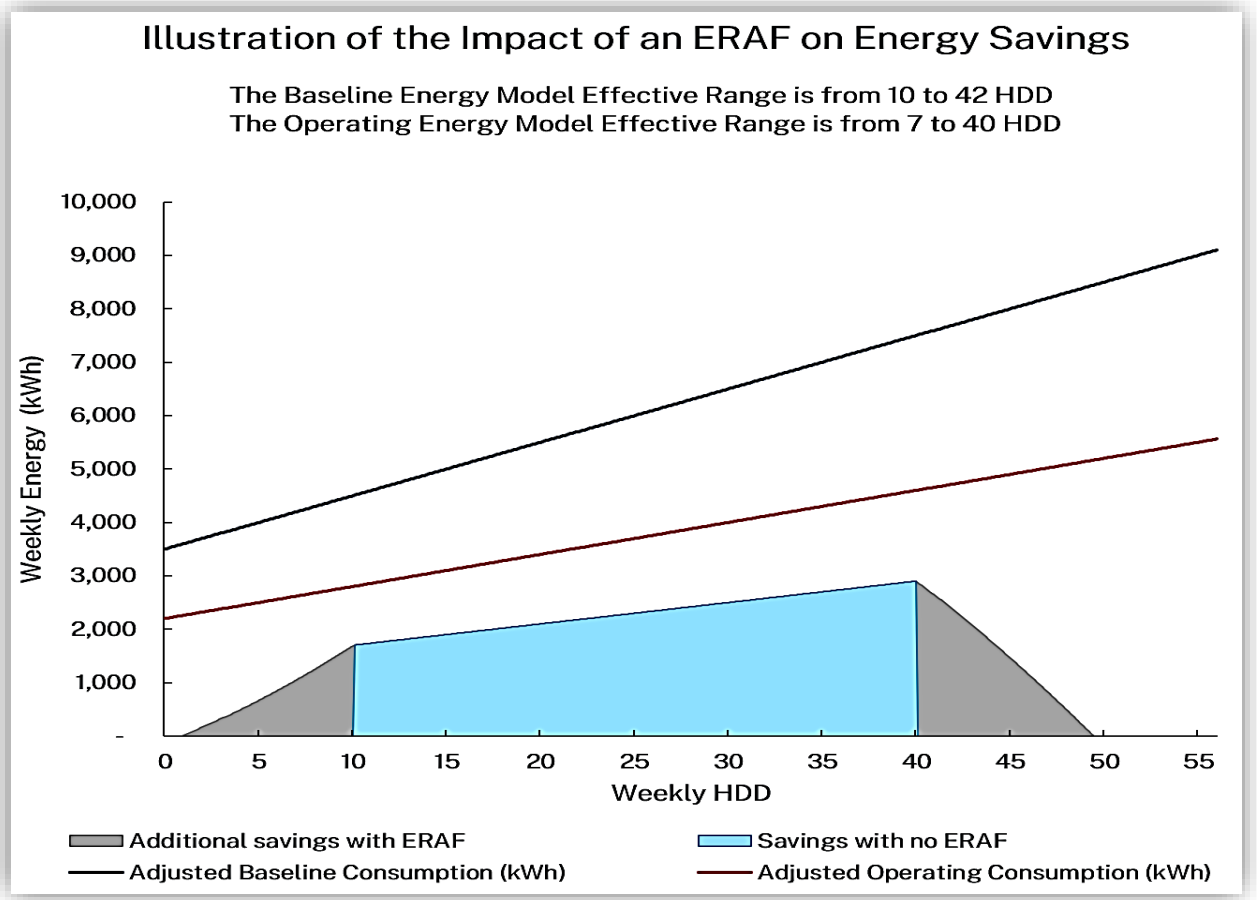
POER: Percentage Outside Effective Range

Changes to PIAM&V

3. Application of Effective Range (Equations 7A.2 and 7A.4)

Example

- Figure 5 from the NRE-A Requirements



Changes to PIAM&V

4. Interactive Energy Effects/Savings

- Interactive energy can cause an **increase** or **decrease** in energy consumption within the Measurement Boundary

Interactive Energy Savings → Interactive Energy Effects

Interactive Energy Effects

Positive **Negative**

- This rule change emphasizes that the **sum of absolute** Interactive Energy Effects must be less than 10%

Changes to PIAM&V

5. Meter calibration requirements

This Rule change:

- Concerns meter calibration requirements for the purpose of performing M&V
- Excludes utility electricity and gas meters from the calibration requirement (only utility meters accredited for use in trade are excluded)

Changes to PIAM&V

6. Updated and added definitions

Change	Term
Add	Measurement Boundary
Update	Site Constant
Add	Normal Operating Conditions
Add	Implementation Period
Add	Coefficient of Variation of the Root Mean Squared Error
Add	Adjusted Coefficient of Determination
Add	t-statistic of Independent Variable
Add	Modelling Frequency
Add	Measurement Frequency
Update	Non-Routine Events
Add	Non-Routine Adjustments
Add	“PIAM&V Method Application Requirements for Non-Routine Events and Adjustments”
Add	“Other Implementations (OIMP) Estimate Method”
Add	“Data Exclusion Method”
Add	“Short Energy Models Method”
Add	“Sub-metering Method”
Add	“Effective Range Adjustment Factor”

Future changes to PIAM&V

- Persistence Model
- Accuracy Factor

- We would like to encourage stakeholders' input on potential future changes to the PIAM&V method

We are currently investigating:

- Creating a more simplified, and up-to-date, version of the Persistence Model
- Changing the Accuracy Factor requirements. Options may include, but are not limited to, updating Table A23 or replacing it with a mathematical formula

Next Steps

Key Dates

Estimated Date	
COB Friday 4 November 2022	Public Consultation Period closes – submissions due
November – December 2022	Review of submissions & drafting of final changes
December 2022 or January 2023	Gazettal
Early 2023	Rule commences

Next Steps

- Read consultation paper and draft Rule available at https://www.energy.nsw.gov.au/regulation-and-policy/public-consultations/energy-saving-scheme-rule-change
- Discuss the proposed changes with manufacturers, suppliers and installers
- Help us identify improvements that would support activity implementation and provide us with data that supports your submission and
- Provide written submissions to sustainability@environment.nsw.gov.au (even if you're happy with the changes!)
- Submissions are due by 5:00 PM, **Friday 4 November 2022**

Q & A

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