

# Consultation guideline: Rental payable for utilising a natural reservoir for storage in South Australia

## Background

The [Petroleum and Geothermal Energy \(Energy Resources\) Amendment Act 2023](#) (PGE Amendment Act), which is an Act to amend the Petroleum and Geothermal Energy Act 2000 (PGE Act), passed both Houses of Parliament on 16 November 2023 and was assented to on 23 November 2023.

Section 27 of the PGE Amendment Act will insert new Section 45A, which introduces rental payable by a licensee who utilises a natural reservoir to store a regulated substance.

Section 45A(2) requires that the prescribed amount of rental is to be calculated in accordance with the regulations.

Consequently, the draft [Petroleum and Geothermal Energy \(Energy Resources\) Amendment Regulations 2024](#) (PGE Amendment Regulations) include a rental calculation in Regulation 8.

## Exemptions

Section 45A(3) of the PGE Amendment Act includes exemptions on rental in the following cases:

- a) Where the regulated substance is used in productive operations that the producer carries out in the State and are associated with the production of a regulated substance.

**Example:** gas production by a PGE Act licensee in the State that is then stored underground by the licensee for later use in the course of, or for purposes incidental to, productive operations.

- b) Where carbon dioxide is produced or sourced within Australia and is not imported.

**Example 1:** carbon dioxide produced from a natural reservoir within Australia.

**Example 2:** carbon dioxide sourced from an industrial plant within Australia.

**Example 3:** carbon dioxide sourced from the atmosphere within Australia.

Section 45A(4) of the PGE Amendment Act also provides the Minister the power to reduce or waive rental payable by a licensee in prescribed circumstances.

## Rental Calculation

Section 45A(2) requires a licensee who utilises a natural reservoir to store a regulated substance to pay to the Minister, by way of rental, a prescribed amount to be calculated in accordance with the regulations. Regulation 8, 9A of the PGE Amendment Regulations sets out the calculation of rental and prescribed rate for this purpose.

As per Regulation 8, 9A(2) the prescribed rate for the rental is \$0.25 per cubic metre. Given the volume of the natural reservoir utilised for storage of a regulated substance will depend on the pressure and temperature of the natural reservoir, the PGE Amendment Regulations allow the Minister to adjust the amount of rental payable accordingly in Regulation 8, 9A(4). Furthermore, to provide flexibility, Regulation 8, 9A(5) allows the Minister to, with the agreement of the person liable to pay rental, vary the method of calculation as the Minister thinks fit in a particular case.

Regulation 8, 9A(1) of the PGE Amendment Regulations outlines two cases for the calculation of rental:

### A) If the regulated substance is held indefinitely in a natural reservoir:

$$A = R \times (V_2 - V_1)$$

**A** is the amount of rent payable.

**R** is the prescribed rate.

**V<sub>1</sub>** is the total volume of the natural reservoir utilised to store the regulated substance in the previous year in which rent was payable by the person.

**V<sub>2</sub>** is the total volume of the natural reservoir utilised to store the regulated substance in the relevant year.

In this case, the amount of rental payable in the relevant year is calculated based on only the new volume of a natural reservoir utilised in that year. Regulated substances stored indefinitely in previous years are not considered by the PGE Amendment Regulations to be an ongoing utilisation of the natural reservoir, and hence do not contribute to the rental payable.

#### Example:

A licensee under the PGE Act utilises a natural reservoir in South Australia to store carbon dioxide that is imported. In the first year after injection begins, the licensee stores 1,000,000 tonnes of carbon dioxide in the natural reservoir. Over the year, the average pressure and temperature of the natural reservoir utilised for storage measured by the licensee was 100 bar and 120 degrees Celsius respectively. Based on the pressure and temperature, the licensee calculates<sup>i</sup> the average density of the injected carbon dioxide to be 167.31 kg per cubic metre. Based on the density, the licensee calculates the total volume of the natural reservoir utilised for storage of the carbon dioxide to be 5,976,929 cubic metres. Therefore, the amount of rent calculated for the first year of storage is:

$$A = R \times (V_2 - V_1) = 0.25 \times (5,976,929 - 0) = \$1,494,232$$

In the second year, the licensee stores another 1,000,000 tonnes of imported carbon dioxide in the same natural reservoir. Over the year, the average pressure of the natural reservoir utilised for storage was 110 bar (an increase of 10 bar from the previous year), while average temperature was 120 degrees Celsius (same as the previous year). Based on the pressure and temperature, the licensee calculates<sup>i</sup> the average density of the injected carbon dioxide to be 188.39 kg per cubic metre. Based on the density, the licensee calculates the total volume of the natural reservoir utilised for storage of the carbon dioxide to be 11,285,066 (5,976,929 + 5,308,137) cubic metres in the second year. Therefore, the amount of rent calculated for the second year of storage is:

$$A = R \times (V_2 - V_1) = 0.25 \times (11,285,066 - 5,976,929) = \$1,327,034$$

As per Regulation 8, 9A(4), the Minister may adjust the amount of rental payable to take into account variations in the pressure and temperature of the natural reservoir as the Minister thinks fit in a particular case.

## B) In any other case:

$$A = R \times V$$

**A** is the amount of rent payable.

**R** is the prescribed rate.

**V** is the average maximum volume of the natural reservoir utilised to store the regulated substance in the relevant year. The average maximum volume is to be calculated by reference to the maximum volume of the regulated substance held in the natural reservoir in each month in the relevant year.

In this case, the amount of rental payable in the relevant year is calculated based on the total volume of a natural reservoir utilised, being an average of the maximum volume of the natural reservoir used for storage of a regulated substance each month.

### Example:

A licensee under the PGE Act utilises a natural reservoir in South Australia to store methane that is not to be used by the licensee in the course of, or for purposes incidental to productive operations, under the PGE Act. In the first year after injection begins, the licensee both stores and withdraws methane in accordance with the following schedule in Table 1.

Table 1: Example schedule for the utilisation of a natural reservoir to store methane.

Month	Maximum methane stored (PJ)	Pressure (bar)	Temperature (C)	Density (kg/m <sup>3</sup> ) <sup>i</sup>	Maximum volume utilised (m <sup>3</sup> )
Jan	2	100	120	50.82	707,788
Feb	4	110	120	55.98	1,285,191
Mar	6	120	120	61.12	1,765,661
Apr	8	130	120	66.24	2,172,241
May	10	140	120	71.33	2,521,536
Jun	12	150	120	76.38	2,825,631
Jul	14	160	120	81.39	3,093,652
Aug	12	150	120	76.38	2,825,631
Sep	14	160	120	81.39	3,093,652
Oct	12	150	120	76.38	2,825,631
Nov	14	160	120	81.39	3,093,652
Dec	12	150	120	76.38	2,825,631

The average of the maximum quantity of methane stored each month over the year is 10 PJ. The maximum volume of the natural reservoir utilised each month is shown in the final column of Table 1 and is calculated based on a heating value<sup>ii</sup> of 55.6 mega-joules per kilogram and the average pressure, temperature and density in the month. The average of the maximum volume of the natural reservoir utilised each month over the year is 2,419,658 cubic metres. Therefore, the amount of rent calculated for the first year of storage is:

$$A = R \times V = 0.25 \times (2,419,658) = \$604,915$$

## Rental Return

Section 27 of the PGE Amendment Act will also insert new Section 45B, requiring a licensee who utilises a natural reservoir to store a regulated substance to provide the Minister with a rental return for the relevant period. The rental return must set out the quantity of natural reservoir used for storage and be accompanied by the rental payable by the licensee for the prescribed period.

The prescribed period is 30 days following the end of each year in which a natural reservoir is utilised to store a regulated substance, as per Regulation 8, 9B of the PGE Amendment Regulations.



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<sup>i</sup> NIST Chemistry WebBook, SRD 69 NIST - <https://webbook.nist.gov/chemistry/fluid/> < © 2023 by the U.S. Secretary of Commerce on behalf of the United States of America. All rights reserved. Copyright for NIST Standard Reference Data is governed by the Standard Reference Data Act. >

<sup>ii</sup> George T. Armstrong and Thomas L. Jobe, Jr, May 1982, "NBSIR 82-2401 Technical Report: Heating Values of Natural Gas and its Components Conversion of values to measurement bases and calculation of mixtures", U.S. Department of commerce National Bureau of Standards Centre for Chemical physics Chemical thermodynamics Division, Washington DC