The Surat Basin population report, 2014

Introduction

The Surat Basin population report, 2014 (the report) provides estimates of the population of non–resident fly-in/fly-out and drive-in/drive-out (FIFO/DIDO) workers who were on-shift in the region during the last week of June 2014. Information regarding the supply and take-up of commercial accommodation utilised by these workers is also summarised.

The Surat Basin’s non-resident population comprises people working in the mining and gas industries, construction workers, and associated sub-contractors. Non-resident workers are not included in estimated resident population (ERP) data released annually by the Australian Bureau of Statistics (ABS). As a result, the full–time equivalent (FTE) population estimates presented in this report, which combine the resident and non-resident populations, provide a more complete indicator of total demand for certain services than either measure used alone.

Key findings

Key findings of this report include:

- Around 14,490 non–resident workers on–shift were counted in the Surat Basin in late June 2014. This was an estimated 2,010 persons (or 16%) more than in June 2013, and 8,050 (125%) more than in June 2012.
- The size of the region’s non-resident population is linked closely to ongoing development of three coal seam gas (CSG) projects. Workforce numbers for these projects expanded during 2013–14 as construction of surface infrastructure facilities and lateral pipelines ramped up.
- Of the three LGAs in the region, Western Downs (R) had the largest non-resident population in June 2014, with 9,100 persons (or 63% of the total). Maranoa (R) accounted for 36% (5,210 persons), with the remaining 1% in Toowoomba (R) (180 persons).
- Western Downs (R) recorded the highest non–resident population growth in the year to June 2014 (1,615 persons). The non-resident population of Maranoa (R) grew by 540 persons, while Toowoomba (R) fell by 145 persons.
- An estimated 13,640 non–resident workers on–shift (or 94% of the total) were housed in worker accommodation villages (WAVs) across the Surat Basin in June 2014. The remainder (850 persons or 6% of the total) occupied other forms of accommodation, including hotels/motels and caravan parks.
- There were 100 WAVs counted in the Surat Basin in June 2014, with most (91 WAVs) located in rural areas rather than in towns. The number of rural WAVs increased by seven during the preceding year, largely in the form of temporary medium-sized establishments (100–499 beds) built to service construction workforces.
- The majority of non-resident workers in the Surat Basin in June 2014 stayed in rural areas rather than towns (85% in Maranoa (R) and 80% in Western Downs (R)). The number of non-resident workers living in towns across Western Downs (R) fell by 845 persons in 2013–14, as CSG construction activity moved further afield.
- Demand for other forms of accommodation in towns eased during 2013–14 as utilisation of WAVs increased. The proportion of hotel/motel rooms in the Surat Basin that were vacant and available more than doubled from 15% in June 2013 to reach 34% in June 2014, with a notable increase in Western Downs (R) (from 6% to 43%).
**Surat Basin update, 2013–14**

The Surat Basin in southern Queensland is emerging as the state’s most significant energy province, in keeping with the advanced development of three major coal seam gas (CSG) projects in the region. The CSG industry was responsible for strong employment growth in the Surat Basin LGAs of Western Downs (R) and Maranoa (R) during 2013–14, as project proponents increased their efforts to complete pipeline and surface infrastructure construction according to schedule. Much of this growth took the form of additional FIFO/DIDO contract labour, which temporarily boosted the size of the region’s non-resident population.

By the end of June 2014, all three CSG projects were at least 75% completed, with construction of gas processing facilities nearing completion or already commissioned. All three gas transmission pipelines linking the Surat Basin to port facilities at Gladstone were completed and undergoing commission during 2013–14 (GasFields Commission, 2014).

- **The Queensland Curtis LNG (QCLNG) project** (Queensland Gas Company (BG Group)) is the most advanced of the three projects, with first LNG delivery to Gladstone expected in the fourth quarter of 2014 (BG Group, 2014). The major contractor for the project significantly expanded its Surat Basin workforce in late 2013 to complete the construction of gas infrastructure (Thiess, 2013). By April 2014, construction of the Ruby Jo central processing plant (CPP) near Dalby and six associated field compression stations (FCS) was substantially complete. A further three CPPs and 17 FCS were under construction between Dalby and Wandoan (Thiess, 2014). More than 2,150 gas wells were drilled and completed by the end of June 2014, more than one-third of the 6,000 wells expected for the project’s two trains (GasFields Commission, 2014).

- **The Gladstone LNG (GLNG) project** (Santos, Petronas, Total and Kogas) in Maranoa (R) was more than 85% complete and on track for first LNG in 2015 (GasFields Commission, 2014). Two of the three upstream gas hubs at Fairview field near Injune were ready for commissioning by the end of June 2014 and the third near Roma was almost completed. Production teams were in place to deliver close out, completion and commissioning of these facilities (Santos 2014a). Welding of the lateral pipeline loop linking the Wallumbilla gas compression facilities to Santos GLNG’s gas transmission pipeline at Comet Ridge was around 60% completed by mid-2014 (Santos, 2014b).

- **The Australia Pacific LNG (APLNG) project** (Origin Energy, ConocoPhillips and Sinopac) was 76% complete by June 2014 (GasFields Commission, 2014), with construction of gas processing facilities at Condobri near Miles and Talinga near Chinchilla finalised in June 2014. First LNG delivery to Gladstone is expected in mid-2015 (GasFields Commission, 2014).

A fourth CSG/LNG project planned for the region (the Surat Gas Project component of the Arrow Energy LNG Project) received Commonwealth Government approval in December 2013, and the associated Arrow Surat Pipeline to Gladstone was approved in 2010. While these projects are yet to reach final investment decision, Arrow Energy had a small operational workforce in Western Downs (R) engaged in domestic CSG production and power generation.

Coal mining activity in the Surat Basin during 2013–14 was limited to five mines—Cameby Downs (Yancoal Australia), Commodore (Millmerran Power), Kogan Creek (CS Energy), New Acland (New Acland Coal) and Wilkie Creek (Peabody Energy)—producing thermal coal for local energy markets and for limited export. Wilkie Creek coal mine ceased production in December 2013 (Peabody 2013).

**Non-resident workers on–shift**

According to Queensland Government Statistician’s Office (QGSO) estimates, there were 14,490 non-resident workers on–shift in the Surat Basin in late June 2014 (Table 1). Around 63% of these (or 9,110 persons) were counted in the LGA of Western Downs (R), while 36% (5,210 persons) were counted in Maranoa (R), and the remaining 1% (180 persons) in Toowoomba (R).

The region’s non-resident population grew by 2,010 persons (or 16%) in the year to June 2014. Most of this growth occurred in Western Downs (R) (1,615 persons or 22%), while Maranoa (R) grew by 540 persons (or 12%). The number of non–resident workers on–shift in Toowoomba (R) declined over this period (~145 persons or ~45%).

Construction of three CSG projects in the Surat Basin continued to be the dominant influence on the size of the region’s non-resident population during the year to June 2014. Time series data show, however, that the growth experienced in 2013–14 was lower than that for 2012–13 (6,035 persons or 94%), when peak expansion of CSG gas field development and pipeline construction workforces occurred.

With construction of all three CSG projects approaching completion in 2014–15, the number of non–resident workers on–shift in the Surat Basin is expected to fall from current levels. While FIFO/DIDO workers will form part of the subsequent production workforces, these will be relatively small in comparison with workforces during the construction phase.
As CSG gas field development and surface infrastructure construction in the Surat Basin moved further afield in 2013–14, an increasing number of non–resident workers on–shift were housed in WAV accommodation located on or close to gas field tenures rather than in town centres. The positioning of WAVs in these rural locations reflects the need to limit daily travelling times between work sites and place of accommodation, largely for reasons of health and safety. An estimated 11,735 non–resident workers on–shift (or 81% of the total) were living in rural areas in June 2014, compared with just 2,760 (19% of the total) living in towns (Figure 2).

Rural non-resident workers far outnumbered those staying in town in both Maranoa (R) (4,450 persons or 85%) and Western Downs (R) (7,285 persons or 80%)\(^1\). While different patterns in distribution and growth over time are evident across both LGAs, Figure 2 shows that the number of non–resident workers on–shift in both LGAs has increased substantially since 2011, with growth most notable in rural areas.

The number of non–resident workers on–shift in rural areas of Maranoa (R) grew from 760 persons in 2011 to 4,450 persons in 2014, with a particularly steep increase of 2,555 persons evident between 2012 and 2013. In contrast, the number of non–resident workers on–shift in town increased more gradually over this period, from 395 persons in 2011 to 760 persons in 2014. Most of these workers were accommodated in the population centres of Roma and Injune.

Prior to 2013, the number of non–resident workers on–shift accommodated in towns in Western Downs (R) outnumbered or equalled those in rural areas. This population was largely concentrated in Dalby, Chinchilla and Miles, with large numbers of construction workers associated with nearby CSG projects staying in commercial accommodation in these towns. A notable shift occurred between 2013 and 2014, with the number of non–resident workers in rural areas increasing by 2,460 persons and the number in town falling for the first time in the reporting period (–845 persons). This redistribution to rural areas is largely attributable to the construction workforces for CSG surface infrastructure moving to more distant parts of the LGA, and the increasing availability of WAV accommodation in those locations.

---

\(^1\) All 180 non-resident workers on-shift in Toowoomba (R) in 2014 were counted in towns (not shown in Figure 2).
Full–time equivalent population estimates

In June 2014, the estimated FTE population of the Surat Basin was 222,395 persons, comprising an estimated 207,905 residents and 14,490 non–resident workers on–shift (Table 2). Non–resident workers on–shift accounted for 27% of the FTE population in Maranoa (R), and 21% of the FTE population of Western Downs (R). Because of its relatively large resident population, non–resident workers on–shift made up a very small proportion (less than 1%) of the FTE population of Toowoomba (R).

Many urban centres and localities (UC/Ls) in the Surat Basin housed non–resident workers on–shift in 2014, boosting their total FTE populations. Chinchilla in Western Downs (R) had the largest non–resident population (1,165 persons), accounting for 18% of its FTE population. Roma in Maranoa (R) had the second-largest non–resident population in town (610 persons or 8%). The majority of workers in these towns stayed in WAVs, with smaller numbers in other commercial accommodation.

Wandoan recorded the highest proportion of non–resident workers on–shift in June 2014, with 230 workers accounting for 41% of its total FTE population of 560 persons. Other UC/Ls where the non–resident population accounted for a notable share of the FTE included Injune (120 persons or 22%) and Miles (245 persons or 16%).

The number of non–resident workers on–shift counted in towns in Maranoa (R) (760 persons) and Western Downs (R) (1,820 persons) in 2014 was small in comparison with the non–resident population in rural areas (4,450 persons and 7,285 persons respectively). Non–resident workers on–shift made up a sizeable proportion of the FTE population of rural areas in both LGAs, accounting for more than half (52%) of the rural FTE in Maranoa (R) and more than one-third (36%) in Western Downs (R). These workers were predominantly engaged in CSG drilling, construction and production activities, and were almost all accommodated in WAVs located close to place of work.

Table 2: FTE population estimates, Surat Basin LGAs and selected UC/Ls, June 2014

<table>
<thead>
<tr>
<th>LGA</th>
<th>Location</th>
<th>UC/L</th>
<th>Resident population (a)</th>
<th>Non–resident workers on–shift</th>
<th>FTE population estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maranoa (R)</td>
<td>In town</td>
<td>Injune</td>
<td>415</td>
<td>120</td>
<td>535</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Roma</td>
<td>7,480</td>
<td>610</td>
<td>8,090</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other towns (c)</td>
<td>1,900</td>
<td>30</td>
<td>1,925</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rural areas</td>
<td>4,055</td>
<td>4,450</td>
<td>8,505</td>
</tr>
<tr>
<td>Maranoa (R) total</td>
<td></td>
<td></td>
<td>13,850</td>
<td>5,210</td>
<td>19,060</td>
</tr>
<tr>
<td>Toowoomba (R)</td>
<td>In town</td>
<td>Oakley</td>
<td>4,630</td>
<td>30</td>
<td>4,660</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Toowoomba</td>
<td>103,005</td>
<td>125</td>
<td>103,130</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other towns (c)</td>
<td>30,025</td>
<td>25</td>
<td>30,050</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rural areas</td>
<td>22,905</td>
<td>0</td>
<td>22,905</td>
</tr>
<tr>
<td>Toowoomba (R) total</td>
<td></td>
<td></td>
<td>160,565</td>
<td>180</td>
<td>160,745</td>
</tr>
<tr>
<td>Western Downs (R)</td>
<td>In town</td>
<td>Chinchilla</td>
<td>5,150</td>
<td>1,165</td>
<td>6,315</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dalby</td>
<td>11,800</td>
<td>125</td>
<td>11,925</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Miles</td>
<td>1,235</td>
<td>245</td>
<td>1,480</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tara</td>
<td>920</td>
<td>35</td>
<td>955</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wandoan</td>
<td>330</td>
<td>230</td>
<td>560</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other towns (c)</td>
<td>1,090</td>
<td>20</td>
<td>1,110</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rural areas</td>
<td>12,965</td>
<td>7,285</td>
<td>20,250</td>
</tr>
<tr>
<td>Western Downs (R) total</td>
<td></td>
<td></td>
<td>33,490</td>
<td>9,100</td>
<td>42,590</td>
</tr>
<tr>
<td>Surat Basin TOTAL</td>
<td></td>
<td></td>
<td>207,905</td>
<td>14,490</td>
<td>222,395</td>
</tr>
</tbody>
</table>

(a) Refer to notes for explanation of ‘in town’ and ‘rural areas’.
(b) QGSO estimates.
(c) UC/Ls with only one accommodation provider or fewer than 20 non–resident workers are aggregated in ‘other towns’.
Source: QGSO estimates
Figure 3: Surat Basin LGAs and selected UC/Ls

Legend
- Main gas transmission pipelines
- Existing rail
- Urban centre / locality
- Coal terminal
- Surat Basin coal measure
- Surat Basin study area
- Local government areas

Source: QGSO, 2014
Non–resident worker accommodation

WAVs were the predominant form of non–resident worker accommodation used across the Surat Basin in June 2014, housing 13,640 non–resident workers on–shift (or 94% of the total) (Table 3). Other types of accommodation, including hotels/motels and caravan parks, accounted for the remainder (850 persons or 6% of the total).

The proportion of non–resident workers accommodated in WAVs has increased markedly across the Surat Basin, growing by 16 percentage points since 2012. This trend coincides with the movement of CSG construction activity further away from towns, and an increasing supply of temporary WAV accommodation in rural areas to house the growing workforce. As a consequence, there has been a decreasing reliance on commercial accommodation in towns, including hotels, motels and caravan parks, to accommodate FIFO/DIDO workforces.

Almost all non–resident workers in Maranoa (R) (4,975 persons or 96% of the total) and Western Downs (R) (8,670 persons or 95% of the total) stayed in WAVs while on–shift in 2014. The share of non–resident workers on–shift in WAVs has increased across both LGAs since 2012. Maranoa (R) recorded a particularly large increase between 2012 and 2013 (from 77% to 93%), while notable growth in Western Downs (R) occurred between 2013 and 2014 (from 88% to 95%).

There were 100 WAVs counted in the Surat Basin in June 2014, with the majority located in rural areas (91 WAVs) (Table 4). Small WAVs of less than 100 beds, which include mobile drilling and exploration camps, accounted for more than half of these (58 WAVs, of which 56 were located in rural areas).

The total supply of WAV accommodation in the Surat Basin increased between 2013 and 2014. Medium–sized WAVs (100–499 beds) accounted for most of this growth, with six additional establishments opening in rural areas. The number of large WAVs (500 beds or more) increased by two over this period, one in town (due to the expansion of an existing facility) and the other in a rural location. There was a net loss of two small WAVs (less than 100 beds), both of which were in town.

Most of the growth in WAV capacity during the year to June 2014 took the form of temporary villages, which were built to cater for FIFO/DIDO workforces engaged in construction of CSG surface infrastructure. Most of these rural facilities are expected to close down and be relocated as construction activity is scaled down in 2015.

<table>
<thead>
<tr>
<th>LGA</th>
<th>WAVs</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maranoa (R)</td>
<td>4,975</td>
<td>235</td>
<td>5,210</td>
</tr>
<tr>
<td>Toowoomba (R)</td>
<td>0</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>Western Downs (R)</td>
<td>8,670</td>
<td>435</td>
<td>9,100</td>
</tr>
<tr>
<td><strong>SURAT BASIN TOTAL</strong></td>
<td><strong>13,640</strong></td>
<td><strong>850</strong></td>
<td><strong>14,490</strong></td>
</tr>
</tbody>
</table>

(a) ‘Other’ includes hotels/motels, caravan parks and other accommodation. Refer to notes for additional information on hotels/motels.

Source: QGSO estimates

Worker accommodation villages (WAVs)

WAVs are commonly used to house unaccompanied non–resident workers. WAVs typically consist of demountable dwellings arranged in a village, with common messing, laundry and recreational facilities.

WAVs vary greatly in size and amenity, ranging from small, mobile drilling camps to well-established villages of up to several thousand beds with a high standard of services and facilities.

Most of the growth in WAV capacity during the year to June 2014 took the form of temporary villages, which were built to cater for FIFO/DIDO workforces engaged in construction of CSG surface infrastructure. Most of these rural facilities are expected to close down and be relocated as construction activity is scaled down in 2015.

<table>
<thead>
<tr>
<th>WAV capacity</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small (&lt;100 beds)</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Medium (100–499 beds)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Large (500+ beds)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total WAVs</strong></td>
<td><strong>10</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

(a) Refer to notes for explanation of ‘in town’ and ‘rural areas’.

Source: QGSO estimates
Time series data show that the number of non-resident workers accommodated in medium-sized WAVs (100–499 beds) and large WAVs (500 beds or more) grew substantially across the Surat Basin between 2012 and 2014. Most of these workers were involved in CSG production or construction activities. The number of non-resident workers staying in small WAVs (less than 100 beds) remained relatively stable over this period, with only slight growth noted in Maranoa (R). Workers in these smaller camps were predominantly involved in CSG exploration, drilling and well completions.

Maranoa (R) recorded an increase in the total number of non-resident workers staying in WAVs from 2012 to 2013 (2,875 persons), mostly in medium-sized establishments (2,750 persons). Growth in Maranoa (R) was more subdued to 2014 (510 persons), occurring almost entirely in larger WAVs (450 persons) and smaller camps (210 persons).

The total number of non-resident workers staying in WAVs in Western Downs (R) increased each year from 2012 to 2014. Around 65% of growth between 2012 and 2013 occurred in larger establishments (1,965 persons), while medium-sized WAVs accounted for most of the remainder (960 persons, or 32% of the total). By contrast, almost all of the growth that occurred between 2013 and 2014 was in medium-sized WAVs (2,100 persons, or 94% of the total).

The increasing supply of WAV accommodation and movement of gas field development away from population centres influenced a fall in demand for hotel/motel accommodation across the Surat Basin in 2013–14. This trend is evident in the higher proportion of hotel/motel rooms that were vacant and available in June 2014 compared with previous years (Table 5).

Western Downs (R) recorded the most notable increase in hotel/motel availability, with vacancy rates rising from 6% in June 2013 to 43% in June 2014. Hotel/motel operators in Dalby particularly noted a downturn in demand from non-resident workers, while the opening of two new motels in Miles during the year further added to supply.

The number of vacant and available hotel/motel rooms in Maranoa (R) grew from 19% in June 2013 to 28% in June 2014. Expansion of WAV capacity in and around Roma contributed to a reduction in demand for hotel/motel accommodation from resource industry and civil construction workers during this period.

### Table 5: Vacant and available hotel/motel rooms, Surat Basin LGAs, June

<table>
<thead>
<tr>
<th>LGA</th>
<th>Occupied by non-resident workers</th>
<th>Vacant and available&lt;sup&gt;(a)&lt;/sup&gt;</th>
<th>Balance&lt;sup&gt;(a)&lt;/sup&gt;</th>
<th>Total hotel/motel rooms&lt;sup&gt;(a)&lt;/sup&gt;</th>
<th>Vacant and available hotel/motel rooms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td>2012</td>
</tr>
<tr>
<td>Maranoa (R)</td>
<td>165</td>
<td>165</td>
<td>270</td>
<td>600</td>
<td>7</td>
</tr>
<tr>
<td>Toowoomba (R)</td>
<td>125</td>
<td>395</td>
<td>800</td>
<td>1,325</td>
<td>15</td>
</tr>
<tr>
<td>Western Downs (R)</td>
<td>310</td>
<td>425</td>
<td>265</td>
<td>1,000</td>
<td>11</td>
</tr>
<tr>
<td><strong>SURAT BASIN TOTAL</strong></td>
<td><strong>600</strong></td>
<td><strong>990</strong></td>
<td><strong>1,335</strong></td>
<td><strong>2,925</strong></td>
<td><strong>11</strong></td>
</tr>
</tbody>
</table>

<sup>(a)</sup> Refer to notes for additional information on hotels/motels and explanation of ‘vacant and available’ and ‘balance’.

Source: QGSO estimates
Notes

(R) – Regional Council  (S) – Shire  UC/L – Urban Centre/Locality

Data in this report are derived from surveys conducted by QGSO in 2014 and other sources. The Survey of Accommodation Providers counted non-resident workers staying in worker accommodation villages (WAVs), hotels, motels, caravan parks and other commercial accommodation on a medium to long-term basis during the last week of June 2014. Short-term and overnight visitors are not regarded as non-resident workers. The Resource Operations Employment Survey collected workforce information from all resource companies with existing operations and projects in the Surat Basin as at June 2014.

Non-resident workers are people who fly-in/fly-out or drive-in/drive-out (FIFO/DIDO) to work and live in the area temporarily while rostered on, and who have their usual place of residence elsewhere. Non-resident workers include FIFO/DIDO mining and gas industry employees and contractors, construction workers and associated sub-contractors. Figures in this report refer to the number of non-resident workers on-shift, or present in the area at a given point in time, and should not be confused with total non-resident workforce numbers.

Data for non-resident workers on-shift presented in this report are a point in time measure, based on best information available at the time of survey. Non-resident worker numbers may vary in response to changing production demands, prevailing weather and industrial disputes. At the time of the 2014 survey, the number of non-resident workers on-shift in the Surat Basin was unaffected by adverse weather events or industrial actions.

Resident population estimates for 2014 are QGSO estimates.

‘In town’ includes populations counted in defined urban centres and localities (UC/Ls) and non-resident workers on-shift within 5km of town. ‘Rural areas’ include populations outside of defined UC/Ls, including non-resident workers more than 5km from town.

WAVs within 5km of a UC/L are included ‘in town’. WAVs more than 5km from a UC/L are allocated to ‘rural areas’.

Hotels/motels include serviced apartments and other rental accommodation occupied by non-resident workers.

‘Vacant and available’ refers to hotel/motel rooms that were not occupied by non-resident workers on-shift or other guests, and were vacant and available on the night of the survey. ‘Balance’ includes hotel/motel rooms occupied by short-term visitors, held for non-resident workers under permanent booking arrangements but not actually occupied on the night of the survey, or otherwise unavailable to prospective guests.

Figures in tables (except Table 4) have been rounded to the nearest five. As a result of rounding, discrepancies may occur between sums of the component items and totals. Percentages and other calculations are made prior to rounding of figures and discrepancies might therefore exist between these calculations and those that could be derived from the rounded figures.

References


