ESSENTIAL SERVICES COMMISSION

MINIMUM ELECTRICITY FEED-IN TARIFF TO APPLY FROM 1 JANUARY 2015

Draft Decision

May 2014

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ACRONYMS & ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
c/kWh	cents per kilowatt hour
COAG	Council of Australian Governments
Commission	Essential Services Commission Victoria
DLF	Distribution loss factor
EIA	*Electricity Industry Act 2000*
ESC Act	*Essential Services Commission Act 2001*
ESCOSA	Essential Services Commission of South Australia
FiT	Feed-in tariff
IPART	Independent Pricing and Regulatory Tribunal, NSW
kW	kilowatts
kWh	kilowatt hour
MLF	Marginal loss factor
NEM	National electricity market
NSLP	Net system load profile
PC	Productivity Commission
POE	Probability of exceedance
PV	photovoltaic
QCA	Queensland Competition Authority
RRN	Regional Reference Node
VCEC	Victorian Competition and Efficiency Commission

CONTENTS

DRAFT DECISION

Pursuant to section 40FBB(1) of the *Electricity Industry Act 2000* (Vic), the Commission's draft decision is that the rate referred to in that section for the calendar year commencing 1 January 2015 is:

a) 7.4 cents per kilowatt hour until the commencement of such time in relation to which no Liable Entities, as defined in the *Clean Energy Act 2011* (Cth), are liable to pay any amount to the Clean Energy Regulator; and

b) thereafter, 6.2 cents per kilowatt hour.

1 INTRODUCTION

The Essential Services Commission ('Commission') is responsible for determining the minimum rate that a relevant retailer must pay to its customers who are small renewable energy generators for electricity they produce and export into the electricity distribution system. The feed-in tariff (FiT) refers to an amount credited to the generating customer per kilowatt hour (kWh) of electricity it exports to the grid. The purpose of the minimum FiT is to ensure that small renewable energy generators receive a fair and reasonable rate for the electricity they supply for use by others.

The small renewable energy generation facilities to which the minimum FiT applies have capacities of less than 100 kilowatts (kW), and produce electricity using renewable energy sources such as wind, solar, hydro or biomass.[1] At present most small renewable energy generation in Victoria is from rooftop solar photovoltaic (PV) systems. It has been estimated that over 180,000 homes and businesses in Victoria had solar PV panels in April 2013 (Climate Commission 2013, 20). Small-scale wind powered generation is not widespread in Victoria.

In August 2013, the Commission determined the current minimum FiT of 8.0 c/kWh that has applied since 1 January 2014. The Commission intends to determine the minimum FiT to apply from 1 January 2015, which it must do before 31 August 2014 otherwise the prevailing rate continues. This Draft Decision presents the Commission's preliminary conclusions on the minimum FiT that should apply in Victoria from 1 January 2015. The Commission invites comment from interested parties.

[1] An important exception is that a 'small renewable energy generation facility' does not include a generating facility that is under either the premium solar or transitional feed-in schemes (EIA s 40F(1)). Further, the Governor in Council, by Order published in the Government Gazette, can specify a facility or class of facility that generates electricity in any way as a small renewable energy generation facility (EIA s 40F(2)).

1.1 COMMISSION'S FEED-IN TARIFF ROLES

Since January 2008, each licensed electricity retailer in Victoria with more than 5,000 electricity customers (relevant retailer) is required to publish and offer generally available renewable energy feed-in terms and conditions. These terms and conditions include the FiT and any other associated terms and conditions. Following amendments in mid-2013, the *Electricity Industry Act 2000* (EIA) requires that the FiT which forms part of the general renewable energy feed-in terms and conditions offered by relevant retailers must not be lower than the minimum FiT determined by the Commission. Before the end of August each year, the Commission determines the minimum FiT to apply in the following calendar year.

The Commission has another regulatory role in relation to general renewable energy feed-in terms and conditions. The Minister administering the EIA can direct the Commission to investigate whether a retailer's general renewable energy feed-in terms and conditions, including prices or other terms and conditions, are fair and reasonable. If they are found not to be fair and reasonable, the Commission must recommend prices, terms and conditions that it considers to be fair and reasonable, and the Minister can impose those prices, terms and conditions on that retailer.

The Commission's regulatory functions relating to FiTs are confined to the generally available renewable energy feed-in terms and conditions. The premium and transitional FiT schemes are outside the scope of the Commission's functions, and of this report.[2]

1.2 PURPOSE OF THIS CONSULTATION

The Commission has made a draft determination of the minimum FiT for the period 1 January 2015 to 31 December 2015 and invites comments on the approach it has taken. The Commission must make and publish its decision on the minimum FiT by 31 August 2014.

[2] These schemes are now closed to new members but will continue to provide beneficial FiT rates for some time to those who are already scheme members.

The key milestones and planned dates for the consultation and implementation process for the 2015 minimum FiT review are set out in Table 1.1.

TABLE 1.1 INDICATIVE REVIEW TIMETABLE

Milestone	Date
Submissions to Draft Decision Paper close	4 July 2014
Final Decision released	15 August 2014
Gazette Notice	22 August 2014
Date of effect	1 January 2015

1.3 HOW TO MAKE SUBMISSIONS

Submissions to this Draft Decision are invited to address any matters that are relevant to the review and within the scope. Written submissions in response to this Draft Decision will assist the Commission to understand the issues relating to determining the minimum FiT for 2015 and will be used by the Commission to inform its final decision. Submissions should address the matters to which the Commission should have regard when determining the generally available minimum FiT to apply from 1 January 2015.

Written submissions should be provided by 5pm on Friday 4 July 2014.

All submissions will be published on the Commission's website as per the Commission's Charter of Consultation and Regulatory Practice, with the exception of any commercially sensitive or confidential information which is identified as such in the submission.

Submissions in response to this Draft Decision can be emailed to:
fitreview@esc.vic.gov.au

Alternatively, submissions can be mailed to:

Feed-in Tariff Review 2015
Essential Services Commission
Level 37 / 2 Lonsdale Street
Melbourne VIC 3000

Questions relating to this consultation can be directed to:

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1.4 STRUCTURE OF THIS DRAFT DECISION

The topics covered in the remainder of this Draft Decision are as follows:

- Chapter 2 discusses the statutory requirements and the guiding policy and economic principles applicable to the Commission's function of determining the minimum FiT.
- Chapter 3 discusses the methodological issues relevant to calculating the value of the power fed-in to the electricity grid from small renewable energy generators, and hence determining the minimum FiT.
- Chapter 4 applies the methodologies discussed in chapter 3 to determine the draft minimum FiT for 2015 and the proposed approach to the treatment of the possible abolition of the Commonwealth Government's carbon pricing scheme.

2 REQUIREMENTS & PRINCIPLES

The scope of this review and the Commission's approach to carrying out its task are governed by a number of specific statutory requirements and also some established general principles. The purpose of this chapter is to briefly outline these important requirements and principles.

2.1 LEGAL REQUIREMENTS

The Commission is required under s 40FBB of the EIA to determine a rate for the purposes of section 40FBA(b)(i) — this rate being the minimum FiT rate for relevant retailers within their general renewable energy feed-in terms and conditions.

The principal statutory requirement that the Commission must address when determining the minimum FiT, is that it must have regard to:

(a) prices of electricity in the wholesale electricity market, and

(b) any distribution and transmission losses avoided in Victoria by the supply of small renewable energy generation electricity (EIA, s 40FBB).

2.2 APPLICABLE PRICING PRINCIPLES

The general principle that the Commission adopted in its determination of the minimum FiT for 2014 is that small renewable energy sources should receive full credit for the benefits of the electricity they supply to the market. This principle is consistent with the views of the Australian Energy Market Commission (AEMC 2012, 231) and the Victorian Competition and Efficiency Commission (VCEC) in its 2012 inquiry into

distributed generation. VCEC concluded that under an 'efficient and fair' FiT, "distributed generators should receive a price that reflects the value of the electricity exported to the grid" (VCEC 2012, 147). This principle was accepted by the Victorian Government (Department of Treasury & Finance 2012). It is also consistent with the Council of Australian Governments' (COAG) principle that FiT rates should:

> *at least equal to the value of that energy in the relevant electricity market and the relevant electricity network it feeds in to, taking into account the time of day during which energy is exported (COAG 2008)*

When the FiT is equal to the value of the power supplied by the small renewable energy generator, it avoids cross-subsidies between consumers with and without PV generation capacity. Cross-subsidies to small renewable energy generators may lead to over-investment in generation capacity and cause unnecessary hardship or expense for customers unable to invest in renewable generation (ESC 2013, 13).

2.3 ISSUES OUTSIDE THE SCOPE OF THE REVIEW

Some of the issues previously raised by stakeholders, such as those that question whether there should be a regulator-determined minimum FiT, and those that question the 'efficient and fair' pricing principle discussed in section 2.3, are outside the scope of the review and are not addressed in this Draft Decision.

Victorian FiTs to-date have all operated as net metering schemes and the Commission proposes to continue to set the generally available minimum FiT on this basis. This means that the electricity production of a small renewable energy generator is firstly used to meet its own consumption, offsetting purchases from the grid, and in periods when the amount it generates exceeds its electricity consumption, the excess is exported to the grid and attracts the FiT. Some jurisdictions have gross metering schemes in which all PV production attracts the FiT, and there is no offsetting of retail tariffs. Net metering schemes are generally more favourable to energy generating consumers. The EIA does not specifically empower the Commission to change the generally available FiT from a net basis to a gross basis, and the Commission will therefore determine the minimum FiT on a net metering basis.

2.4 TIME VARYING FITS

The Commission has previously indicated its intention to consider the opportunities to develop time varying FiTs when determining the 2015 FiT (ESC 2013, 16). The Commission has been advised that the EIA requires the Commission to set a single FiT rate for each calendar year, precluding the use of time varying minimum FiTs. Accordingly, time varying FiTs are not being considered as part of this review of the minimum FiT.

Stakeholders are welcome to discuss time varying FiTs in their submissions, and the Commission may consider those views as part of any future research it conducts.

3 METHODOLOGIES

A number of Australian state-based regulators have carried out consultations in regard to FiTs and, by and large, similar methodologies have been adopted for quantifying a fair and reasonable FiT. This chapter explains the methodology adopted by the Commission in its FiT determination for 2014 and highlights some of the issues regarding methodology that need to be addressed when determining the minimum FiT.

3.1 BENEFICIARIES OF EMBEDDED GENERATION

In quantifying the benefits associated with electricity fed into the network from small generating consumers, Australian regulators have mainly focused on direct benefits to the retailers supplying those consumers. This is for reasons conveniently summarised by the Queensland Competition Authority (QCA):

> *… setting the retailer-funded feed-in tariff at a rate any higher than the direct financial benefit to retailers would likely result in retailers increasing electricity prices for all customers to cover costs that exceed the benefit they receive. (QCA 2013, 10)*

The Independent Pricing and Regulatory Tribunal (IPART) of NSW referred to this as the 'direct retailer benefit principle'. This does not preclude the possibility that there may be other benefits accruing to other businesses, such as network infrastructure providers. If there are any benefits of that kind, there may be inconsistency between the 'direct retailer benefit principle' and the principle that small renewable energy sources should receive full credit for the benefits that the power they supply provides to the market (see section 2.3). However, on the whole, Australian regulators have either rejected, or have yet to be convinced, that there are material benefits accruing to parties other than retailers.

3.2 COMMISSION'S METHODOLOGY FOR THE 2014 FIT

Factors that are relevant to the value of power supplied by small renewable energy generators include:

- The marginal cost of the equivalent amount of electricity that would otherwise need to be purchased from central generators.
- The locational value of electricity produced close to the final consumers compared to relatively distant central generators.

The marginal cost of obtaining the same amount of energy for the same market from alternative sources, is referred to as the avoided energy cost of small-scale generation. It is based on the cost of purchasing the same amounts of energy, at the same times, from central generators via the electricity pool.

In its August 2013 determination of the minimum FiT to apply in 2014, the Commission adopted a methodology which was consistent with the 'wholesale price plus' approach previously recommended by VCEC (2012). The Commission included the value of electricity in the wholesale market and avoided line losses, as combined in the following formula:

(3.1) $$\text{FiT} = \text{Loss factor} \times \sum w_h p_h$$

where *h* indicates the ordered half-hourly periods over the year, *w* is the set of weights used to represent the proportion of annual solar PV exports which occurs in period *h*, and *p* refers to the forecast electricity pool price in period *h* (ESC 2013, 30). In this formula, the loss factor is a locational benefit of small renewable energy compared to that produced by central generators.

This method previously received support from several stakeholders. For example, Origin Energy stated:

> *… we generally support the method adopted by the Commission to determine a minimum value of net feed-in electricity and acknowledge forecasting the wholesale value of electricity sent to the grid by small embedded generators is difficult, particularly given the uncertainty imposed through future changes to climate policy at a national level. (Origin 2013)*

Similarly, the Energy Retailers Association of Australia (ERAA) considered:

> *… the "wholesale price plus" methodology, which reflects avoided wholesale market costs and avoided distribution network losses, as used to estimate the draft FiT, to be a reasonable approach. (ERAA 2013)*

The method described by equation (3.1) is also consistent with the 'efficient and fair' principle identified by VCEC and the statutory requirements. For these reasons, the Commission considers that this method remains appropriate for determining the 2015 minimum FiT.

3.3 COMPARISON WITH OTHER JURISDICTIONS

Several state-based regulators have determined FiTs or provided guidance in relation to a fair and reasonable FiT range. In general, they have adopted similar approaches, although there are some differences due to the specifics of regulatory roles and terms of reference. The regulatory approach to FiTs is normally based on retailers' avoided energy costs, which is the cost of buying equivalent amounts of electricity at equivalent times from the pool, including adjustment for line losses.

One important difference between regulatory methods of determining the value of feed-in electricity relates to the appropriate set of weights to be used in equation (3.1) for averaging wholesale electricity prices. In Victoria almost all small customers now have interval metering, including all small renewable energy generators. By comparison, in some other states only a small proportion of customers have interval metering. Because of these different metering arrangements there are different wholesale electricity market settlement processes and hence the calculation of retailers' avoided cost is different. In Victoria, the appropriate set of weights is given by the aggregate PV export profile (see ESC 2013, 26). In South Australia and Queensland settlements for small customers are mainly based on the Net System Load Profile (NSLP), and the regulators in those states have used that profile for calculating retailers' avoided energy cost. In New South Wales, IPART has used both methods.

The regulators have been consistent in not including any savings in relation to the following types of costs when quantifying the FiT:

- *network costs:*
  which are the charges that retailers pay to electricity distributors for using the transmission and distribution systems
- *hedging costs:*
  the average costs incurred by retailers in managing risks associated with electricity pool price volatility
- *green scheme costs:*
  such as the cost of obtaining certificates to satisfy obligations under Commonwealth and state renewable energy and energy efficiency quota schemes
- *retailer costs:* including the direct costs of operating the retail business and the commercial return to investment and risk.

The Commission reached the same conclusions on these matters when determining the Victorian minimum FiT for 2014. Similarly, like the other regulators, the Commission rejected proposals to include in the FiT the claimed wider benefits of feed-in electricity associated with a 'merit order effect' in relation to average electricity prices. On most of these issues, the Commission considers that the positions reached in its decision on the minimum FiT for 2014 do not need to be revisited in this review, especially in those cases where most of the Australian state-based regulators have considered them thoroughly in previous reviews and all have reached the same conclusions.

With regard to network infrastructure costs, Australian regulators have generally found that there is an insufficient basis to allow for any avoided costs of this kind associated with PV electricity exports. When determining the 2014 minimum FiT, the Commission observed that electricity produced by small renewable energy generators is not carried on the transmission system, which might imply that potentially there are avoided transmission costs. However, the Commission concluded that any benefits of this kind had not been substantiated. This issue is briefly discussed in section 3.7.

With regards to two differences between the method previously used by the Commission and the methods used by other Australian jurisdictional regulators:

- *the calculation of the loss factor:*
  This topic is discussed in section 3.6. The Commission proposes to adopt a method of calculating the loss factor which is more consistent with other jurisdictions.

- *the omission of market operator fees:*
  Most other jurisdictions have included market operator fees as an avoided cost to retailers because these fees are levied against the retailers' electricity purchases from the pool.

  The Commission previously considered this to be a comparatively immaterial item (ESC 2013, 21), with market operator fees found to add approximately 0.05 c/kWh to the FiT (SKM-MMA 2013, 11). Given the adjustment to the FiT resulting from changes in wholesale market price forecasts, the Commission considers it appropriate to factor in market operator fees to its calculations going forward.

3.4 FORECAST WHOLESALE ELECTRICITY PRICES

An important element of setting the minimum FiT is the forecast value of electricity in the wholesale market in each period of each day of the forecast year. For 2014 the Commission used a forecast produced by ACIL Allen Consulting using its *Powermark* electricity market model. The Commission again commissioned ACIL Allen to prepare a forecast of electricity prices for the current FiT review.

TABLE 3.1 AVERAGE VICTORIAN WHOLESALE ELECTRICITY PRICE FORECASTS ($/MWh)[1]

	2014 with carbon price	2014 no carbon price	2015 with carbon price	2015 no carbon price
Forecast May 2013	67.66	54.95	..	..
Forecast Feb 2014	58.88	48.00	57.32	44.50

Note: 1. Prices are simple (un-weighted) averages for each calendar year.

Source: (ACIL Allen Consulting 2014).

Forecasts based on market models have the benefit that they can take into account up-to-date information about significant changes in demand or supply conditions likely to affect the electricity market in 2015. This forecasting method also permits forecasting under alternative scenarios. The forecasts in Table 3.1 are presented for the alternative scenarios relating to the abolition of the Commonwealth Government's carbon price, or retention of the current arrangements.

Table 3.1 shows that ACIL Allen Consulting's current forecast for the unweighted average 2014 electricity pool price in Victoria is $58.88/MWh, which is a substantial reduction from its May 2013 forecast of $67.66/MWh. This reflects a revised outlook for demand and supply in the NEM. The current forecast for the Victorian pool price in 2015 is $57.32/MWh, indicating the supply and demand conditions in 2015 are expected to be broadly similar to 2014. A repeal of the carbon price would reduce the average electricity price forecast in 2015 to $44.50/MWh, a 22 per cent reduction. The forecast confidence intervals provided by ACIL-Allen indicate there is an 80 per cent likelihood that the 2015 average pool price will be within the range $52 to $67 per MWh, or approximately 91 to 117 per cent of the forecast price.

An alternative to the market model-based method of forecasting electricity prices previously mentioned is to use the strike prices within publicly traded futures contracts (swaps and caps).[1] This method has been advocated by the AEMC because it regards forecasts based on futures prices as generally producing better energy price forecasts (AEMC 2013, iii).

Table 3.2 shows that the average Victorian pool price for 2015 predicted by the base swap price is comparatively low at $39.58/MWh. However, a futures-based price forecast does not permit the testing of alternative scenarios, as the swap price factors in the market's expectations regarding the abolition of the carbon price scheme.

[1] ASX-Energy operates a publicly traded market for wholesale electricity market futures.

TABLE 3.2 BASE SWAP ELECTRICITY FUTURES PRICES VICTORIA
($/MWh)

Forecast year & quarter	Transaction year & quarter	Quarters ahead	Average base swap price
2015:1	2013:4	5	44.87
2015:2	2013:4	6	37.09
2015:3	2013:4	7	37.26
2015:4	2013:4	8	36.70
2015			39.58[1]

Notes: 1. Weighted average using the average share of Victorian NEM demand occurring in each quarter of the 15 years ending December 2013.

Data Source: ASX-Energy.

A regression analysis of actual quarterly electricity pool prices in four NEM jurisdictions against base swap prices relating to the same periods was carried out by Economic Insights on behalf of the Commission. This analysis found that futures-based forecasts of the electricity pool price are unbiased predictors, but provide little information about likely future pool price levels, as evident from the large regression model standard errors. While it may be possible to improve the forecasting ability of such models, at the present stage the Commission prefers market model-based forecasts.

It is also necessary to decide how the possible removal of the Commonwealth Government's carbon price scheme should be dealt with in the context of this review. If the carbon price legislation is repealed before the end of August 2014, the Commission would be able to set the minimum FiT on an 'ex carbon' basis. However, if the carbon price legislation is not repealed before the Commission makes a decision on the 2015 FiT, then either:

- the 2015 FiT could be determined solely on the basis of the prevailing law at the time of the decision, or
- an 'ex carbon' FiT could also be established, which would come into force if and when the carbon price is abolished.

The Essential Services Commission of South Australia (ESCOSA) adopted the second of these approaches when it recently established a FiT of 7.6 c/kWh for 2014, but if the carbon price is repealed during 2014 the FiT will automatically revert to 6.0 c/kWh (ESCOSA 2013). The Commission intends to adopt a similar approach to ESCOSA, by determining the 2015 FiT based on the prevailing law at the time of its decision, and determining an 'ex carbon' FiT that will become effective if and when the carbon price is repealed.

Should further certainty regarding the status of the carbon price be available prior to the Commission's final decision, any appropriate amendments to the decision will be considered.

3.5 ELECTRICITY FEED-IN PROFILES

As previously mentioned, the appropriate set of weights to use in formula (3.1) when applied to the Victorian context differs from most other states due to the extensive adoption of interval metering. Given the pool settlement procedures applied to interval metered customers, the appropriate set of weights is based on the average time-profile of PV net exports. Previously, when determining the minimum FiT for 2014, the Commission based its calculations on the typical electricity production profile of a 1 kW north-facing PV unit in Melbourne.

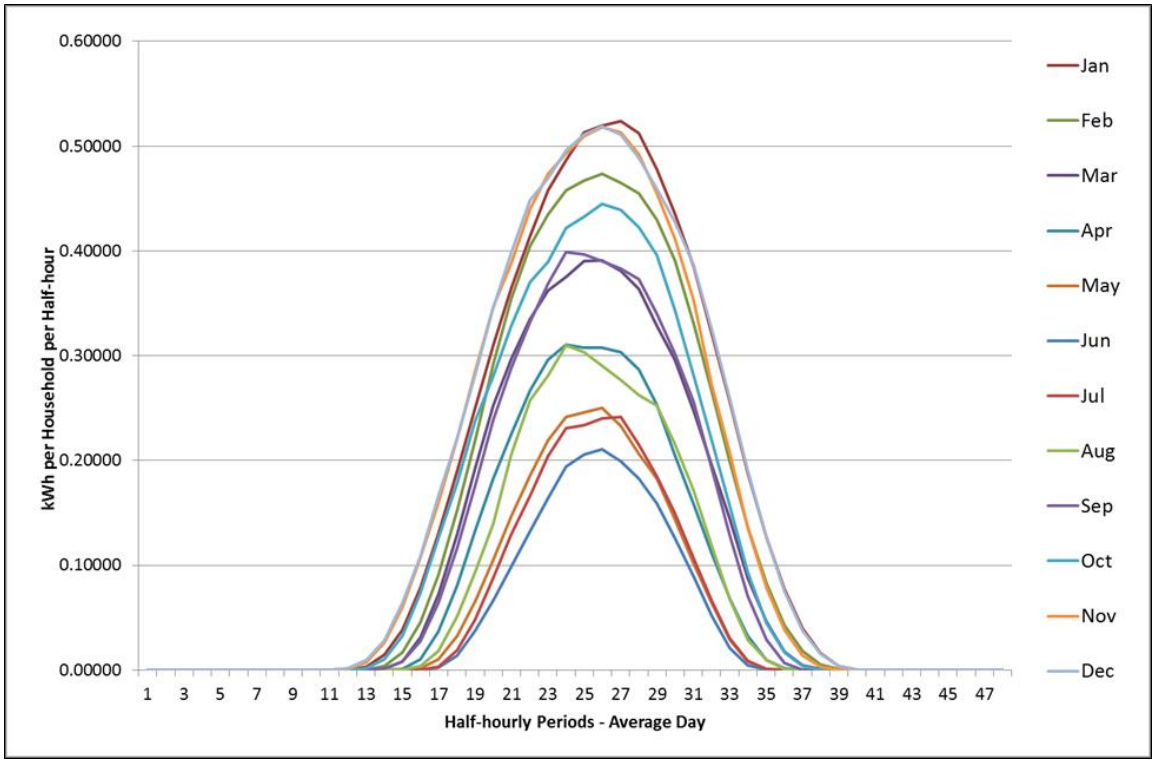
For the purpose of applying the same method, the Commission obtained an additional year of data on the typical electricity production profile of a 1 kW north-facing PV unit for 2012-13. This data has been used to calculate a nine-year average PV production profile (ending in 2012-13), rather than the eight-year average (ending in 2011-12) used previously. Extending the period of averaging by one year to include the latest data makes only a small difference to the results obtained.

As observed by EnergyAustralia in its submission to the 2014 draft decision, it may be preferable to use data for the actual time-profile of small embedded generator net exports. For this review, the Commission gathered net export records for a random sample of 1163 small renewable energy generators in 2013 from Victoria's electricity distribution businesses. This data has been consolidated and a summary of actual PV exports on an average day in each month is shown in Figure 3.1. These profiles are

normalised to an annual total of 1 kWh to provide a suitable set of weights for calculating the average value of FiT exports.

Figure 3.1 shows that PV exports tend to be higher in summer months because the hours and intensity of sunshine is at its greatest. This is an important reason why the value of PV exports tends to be slightly higher than the unweighted average electricity pool price.

FIGURE 3.1 ACTUAL AVERAGE PV EXPORT PROFILES VICTORIA
(kWh per consumer on Average Day per Month)



Data source: De-identified consumption and export records provided by Victorian electricity distributors.

The Commission's preference is to use the actual profile of small embedded generator net exports rather than the profile of production of a typical 1kW north-facing PV unit. However, the value of small renewable exports is calculated using both methods for comparison purposes in Chapter 4.

3.6 AVOIDED LINE LOSSES

Line losses are taken into account when determining the FiT by applying a loss factor to the weighted average wholesale price of electricity, as shown in formula (3.1). The wholesale electricity price published by the Australian Energy Market Operator (AEMO) is determined at the Regional Reference Node (RRN), and this price includes transmission losses between generators and the RRN.[2] The loss factor used in formula (3.1) takes into account the cost of line losses that occur between the RRN and the end-customer meters.

This has two parts:

- Transmission line losses between the RRN and each bulk supply connection point (or terminal station) are measured by marginal loss factors (MLFs) published by AEMO.[3]
- Distribution line losses are measured by distribution loss factors (DLFs), which are estimated by each distribution network service provider and published by AEMO.[4]

Previously the Commission included only distribution losses in the loss factor, while some other regulators have included transmission losses between the RRN and terminal stations, which are the off-take points of the transmission system. These may be positive or negative depending on the location of those off-take points relative to the RRN and the generating plants. As noted above, transmission line losses between the generation plants and the RRN are included in the quoted pool price. Transmission losses downstream of the RRN adjust the calculated line losses to their actual levels. Although in aggregate they are comparatively small, their inclusion in the analysis serves to better align the Commission's methodology with those of other regulators.

The combined loss factor for a particular locality and voltage class can be calculated as:

[2] In Victoria the RRN is at Thomastown.

[3] The MLF measures the amount of additional generation that would be required at the RRN to deliver 1 kW of electricity to the transmission network connection point (or terminal station).

[4] The DLF represents the average quantity of electricity that needs to be transported across a distribution network in order to provide for one unit of consumption at the customer's premises. DLFs are generally greater than one.

(3.2) Loss factor = MLF × DLF

To date a uniform minimum FiT has applied throughout Victoria, in which case the MLF and DLF used in formula (3.2) are weighted averages for all locations in the State.

The above formula is consistent with the 'direct retailer benefit principle' because it reflects the way that retailers pay for electricity via the settlements process managed by AEMO. The amount of electricity that retailers pay for in each financial settlement period is based on the metered loads of their customers adjusted for the relevant loss factors so that it equals the amount delivered to them at the RRN (see AEMO 2012).

This adjustment for loss factors also acknowledges that distributed generation tends to reduce average network line losses because the electricity exported by small renewable energy generators is usually consumed by nearby customers, resulting in minimal line losses. Several regulators have examined whether reduced line losses of this kind represent additional benefits flowing to other consumers that ought to be included in the FiT. The Commission agrees with the QCA when it concluded that the benefits of reduced line losses are already fully taken into account through the loss factors applied to wholesale electricity purchases from the NEM, and:

> *… attempting to quantify the benefit of reduced loss factors, and returning it to PV customers through a feed-in tariff, would mean that the benefit was actually double-counted and would result in an overstated feed-in value for PV exports (QCA 2013, 15).*

Equation (3.2) has been quantified as follows. AEMO estimates the MLF for every transmission network connection point (AEMO 2013, 36–37). Using this data, we estimate the weighted average MLF in 2013-14 for Victorian mass-market customers at 1.0093.[5] DLFs are estimated by the distribution network service providers in each zone for each line voltage class and published by AEMO (2013b). Using these published DLFs, we estimate that for a low voltage customer on Victoria's short sub-transmission

[5] The weights used in this calculation are the total billing units (MW) of mass market customers at each terminal station used for the levying the Transmission Use of System (TUOS) location charge. This data was provided by AEMO to the Commission on a confidential basis.

systems, the weighted average DLF for 2013-14 was 1.0602.[6] That is, about six per cent of the electricity supplied into the distribution system is lost before it reaches the customer. The overall loss factor is therefore (1.0093 × 1.0602) = 1.0701. For the reasons already given, the Commission considers this to be the appropriate loss factor to apply in equation (3.1).

3.7 OTHER CONSIDERATIONS

Some aspects of the benefits of small renewable energy generation remain uncertain. Here we briefly mention some questions that are closely related to the contribution of this source of energy to system-wide supply during periods when network load is at its greatest.

One question is whether solar PV exports may have higher value when there is more certainty over its contribution to peak-day supply. For example, ESCOSA noted that to "the extent that a portion of total installed solar PV generation can be relied upon to meet customer demand at any point in time, the total amount of hedge cover required by a retailer will be reduced by that portion" (ESCOSA 2012, 39). Realising value of this kind may depend on innovations in retailer contracts with their PV customers.

Another question is whether there are any network benefits associated with small renewable energy generation, particularly since energy exports from distributed generators are not carried on the transmission network. The Commission has previously observed that avoided costs of this kind have yet to be established. Australian regulators have generally not recognised any specific network benefits associated with small renewable energy generation. IPART of NSW suggested that if there are any network benefits (or costs) of small-scale PV generation, they should be directed to PV customers, but only where consistent with the 'direct retailer benefit principle' (IPART 2012). The Commission agrees that, if there are any network benefits, it would not be feasible to include them in the minimum FiT unless they were reflected in network charges. Resolution of these questions appears to depend on the national rule-making and regulatory bodies responsible for network tariffs.

[6] The weights used in this calculation were the numbers of customers in each distribution zone.

4 AVOIDED COST CALCULATIONS

The previous chapter explained the methodologies and data inputs used to calculate the value of embedded generation exports. But we also want to understand the influence on the result of the main changes in inputs and methods since the previous review, including:

- the revised outlook for electricity prices due to changes in supply and demand conditions in the NEM;
- the use of actual PV export profiles rather than a standard production profile of a 1 kW north-facing unit in Melbourne; and
- revision to the calculation of the loss factor.

This chapter quantifies the value of embedded generation exports under different assumptions to shed light on these questions and also to derive the appropriate minimum FiT for 2015.

4.1 SCENARIO ANALYSIS

In Table 4.1, the average value of feed-in electricity is shown for 2014 and 2015 under some different assumptions. The 'Solar Export Profile - Actual' refers to the export profile derived from PV customer export data provided by the electricity distribution network service providers. The 'Standard Production Profile' refers to the nine-year average for half-hourly production of a 1 kW north-facing unit.

The first row of the table is based on the electricity price forecast used to determine the 2014 minimum FiT. The avoided cost estimate of 7.78 c/kWh (standard production profile scenario) broadly corresponds to the Commission's previous estimate of 7.62 c/kWh. The difference is because:

- a nine-year average production profile is used rather than the eight-year average used previously (which raises the estimate from 7.62 c/kWh to 7.66 c/kWh)
- the loss factor of 1.07 is used, rather than 1.06 used previously (which raises the estimate from 7.66 c/kWh to 7.73 c/kWh)
- the consideration of the impact of market operator fees (which raises the estimate from 7.73 c/kWh to 7.78 c/kWh)

TABLE 4.1 VALUE OF FEED-IN ELECTRICITY
(c/kWh)

Electricity Price Forecast (ACIL-Allen)	Forecast for Year	Carbon Pricing Scenario	Solar Export Profiles	
			Actual	Standard Production Profile
May 2013 Forecast	2014	With carbon	7.77	7.78
Feb 2014 Forecast	2014	With carbon	7.33	7.42
		Without carbon	6.11	6.26
	2015	With carbon	7.35	7.39
		Without carbon	6.15	6.28

Source: Commission estimates.

Table 4.1 shows that the choice between the standard production profile and the actual solar export profile does not significantly affect the estimated value of PV exports under any of the different electricity price forecasts. This demonstrates that the method previously used by the Commission to estimate the PV export profile provides was reasonable.

Although the latest forecast for the electricity price in 2014 of $59/MWh is almost $9/MWh lower than the May 2013 forecast of $68/MWh (see Table 3.1), the reduction in the value of PV exports is more moderate. The reduction is 0.4 c/kWh from 7.8 c/kWh to 7.4 c/kWh. The electricity price forecast shown in Table 3.1 is a simple (un-weighted) average of the pool price over the whole year, but the forecast was produced for each hour of each forecast year. The decline in the forecast pool price is comparatively less during the hours that embedded generation is exporting than at other times.

4.2 FEED-IN ELECTRICITY ESTIMATES

Table 4.2 shows the rounded forecasts of the value for feed-in electricity in 2015 based on the actual solar profile.

TABLE 4.2 ESTIMATES OF FEED-IN ELECTRICITY
(c/kWh)

	Forecast Feed-in Value
With carbon price	7.4
Without carbon price	6.2

Source: Commission estimates.

In the previous review the Commission concluded that it could determine the minimum FiT from within the range of reasonable estimates (ESC 2013, 33). While there may be a degree of volatility in the estimates of the value of feed-in electricity from year-to-year, the Commission considers that these forecasts are the best estimates available. Further, the actual PV export profiles used in this estimation provide more certainty than in the previous review. Consistent with this approach, and that taken in other jurisdictions, the Commission proposes to adopt the forecast FiT value shown in Table 4.2.

The Commission's draft decision is to adopt a minimum FiT of 7.4 c/kWh to apply from 1 January 2015. However, if the Commonwealth Government abolishes the carbon price at any time before 1 January 2015, the minimum FiT to apply from 1 January 2015 will be 6.2 c/kWh. If the Commonwealth Government abolishes the carbon price at any time from 1 January 2015 to 31 December 2015, the minimum FiT to apply from the date of effect of abolition will be 6.2 c/kWh.

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