

Regional/Global Comparison of Retail Electricity Tariffs

Executive Summary

May, 2016

International Energy Consultants

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Introduction



- Meralco has commissioned International Energy Consultants (IEC) to prepare an independent report comparing
 Meralco's retail electricity tariffs with those in selected markets from the Indo-Pacific region and worldwide
- This Report:
 - Aims to provide a detailed snapshot of tariffs at various consumption levels in 16 selected markets (including Meralco) as well as lower resolution data for a further 28 markets, at the beginning of 2016
 - Serves to update a previous report that was prepared by IEC in 2012 for the same markets and examines the change in tariffs over the intervening 4 year period
 - Attempts to investigate the cost drivers, reasonableness and affordability of Meralco's tariffs
- Note that this Executive Summary is only a partial version of the Main Report & Appendices. Persons wishing to view the full report should make inquiries directly to Meralco

Methodology



- For this Report, IEC has conducted a detailed survey and analysis of retail electricity tariffs and costs in 15 Core markets (13 countries and 2 US states) in the Indo-Pacific region <u>plus</u> Meralco, as well as a supplementary, less comprehensive "meta-analysis" of 27 countries in the Euro area and the 48 remaining US states
- The 15 Core markets in the survey include the following:
 - Subsidized markets: Australia (WA), Indonesia, Malaysia, Thailand, South Korea, South Africa, Sri Lanka, Taiwan
 - Unsubsidized markets: Japan (Kansai), Hong Kong, Singapore, NZ, California (PG&E), Hawaii, Canada (Ontario)
- These markets were selected based on availability and quality of data with a focus on those which would provide a representative range of regional cost and tariff structures. These are the same markets reviewed in a similar report prepared in 2012
- At the time of preparation, only 3 (NZ, Singapore and Meralco) of the core markets are deregulated (although Japan became fully deregulated in April 2016). 17 US states are deregulated (neither Hawaii nor California)
- For each of the 15 Core markets (& Meralco), retail tariffs were calculated for Residential customers @ 100, 200, 400, 800 & 1500kWh per month as well as Commercial (40kW) and Industrial customers (2MW) each operating at @ 40% and 80% load factors. This data was calculated using published tariff schedules for each market's respective utility/supplier and cross-checked with actual customers bills (where available)
- Tariffs for each of the supplementary 27 countries in Europe and 50 US states were sourced from data published by Government energy agencies and were not all verified separately by IEC. Tariff data for these supplementary markets is presented for customer categories which may vary in size from those presented for the Core markets
- Wherever possible, tariffs were unbundled into constituent components, for ease of comparison with Meralco's unbundled rates (eg. Generation, Transmission, Distribution, Other, VAT)
- Tariffs for each of the 15 Core markets (and Meralco) were calculated for January 2016 in USc/kWh using the average exchange rate for that month.
 Tariff data for European markets and the 48 US states are reported for July-December 2015 and December 2015 (respectively) which was the most recently available data
- The generation component of Meralco's tariff was assumed to be equal to the regulated charge for all customers. Contestable customers, which already comprise c.20% of volume in the Meralco franchise area, pay an unpublished negotiated rate which could be higher or lower than the regulated charge



International Energy Consultants



- IEC is a Perth-based consulting firm which specializes in providing power market advisory services to companies operating in and associated with the IPP sector within the Asia-Pacific region
- IEC has been operating for over 15 years and has a major client list which includes: BHP Billiton, Shell, CLP Power,
 InterGen, Itochu, JPower, OneEnergy, PTT, EGCO, Arcapita, Woodside Energy, BG, Sithe, Blackstone, Origin Energy,
 Standard Chartered Bank, GNPower, Meralco, Macquarie Bank, San Miguel & YTL
- Since inception, we have undertaken multiple engagements acting as both Sponsor's and Lender's Market Consultant for both acquisitions and greenfield IPP developments throughout Asia
- IEC specializes in modeling most of the major power markets in the Asia-Pacific region including: Philippines, Singapore, Indonesia, Vietnam, NZ, Taiwan, Japan & Korea. For each of these markets we have a detailed customized dispatch model and database and a deep understanding of the market mechanics and regulatory framework.
- We also provide a range of general IPP development services including: acquisition due diligence, greenfield project development, fuel demand forecasting, carbon analysis, strategic/business planning, in-house training courses and temporary secondment of personnel.
- IEC's Managing Director and lead consultant Dr John Morris is recognized as a leading authority in deregulated power
 markets in the Asia region. Dr Morris was formerly Country Manager for InterGen in Indonesia and Managing Director
 of InterGen in Singapore. He also holds a PhD in Geology and has worked extensively throughout Asia and globally in
 the oil/gas exploration industry

Key Questions



The key questions addressed in this report are the following:

- Tariff Composition: What is the composition of Meralco's retail tariffs? How do Meralco's rates compare with other countries?
- Tariff Differential: What are the main factors driving differences between Meralco's tariffs and those in other countries?
- Tariff Changes: How have Meralco's tariffs changed since the last survey four years ago and how do these changes compare with other markets?
- Tariff Reasonableness: Are Meralco's tariffs fair & reasonable?
- Tariff Affordability: How affordable are Meralco's tariffs for its 5.3 million residential customers?

Summary of Answers: Tariff Composition

What is the composition of Meralco's retail tariffs?



• The main component of Meralco's regulated retail tariff is the Generation Charge (59% of the average retail tariff down from 65% in 2012) which includes:

 Legacy IPP's (QPL, FG) 	49%
• PSA's	39%
 WESM charges 	7%
• Renewables	<0.1%
 Ancillary services¹ 	6%

- IEC estimates that embedded fuel costs comprise c.36% of the total Generation Charge (down from c.50% in 2012) and 21% of the total tariff (down from 33% in 2012)
- The Transmission Charge (excl Ancillary Services) comprises 9% of the average tariff (unchanged from 2012)
- The Distribution Charge comprises 17% of the average tariff (up slightly from 16% in 2012). (This is the only part of the tariff that accrues to Meralco. All other charges are collected by Meralco on behalf of third parties).
- VAT and other taxes and statutory charges comprise 16% (up from 10% in 2012) of the average tariff
- Retail competition commenced for >1MW customers in July 2013 and, in Jan 2016, accounted for c.20% of kWh sold in Meralco's network area. The contestability threshold is scheduled to reduce from 1MW to 750kW in 2016 and 500kW in 2018
- Contestable customers have a tariff that includes a generation charge that is likely to be different (higher or lower) than the regulated Meralco charge, depending on how the suppliers are able to source their wholesale requirements

Note

^{1.} Ancillary services are included in the Transmission component of the published tariff but are ultimately paid to generators

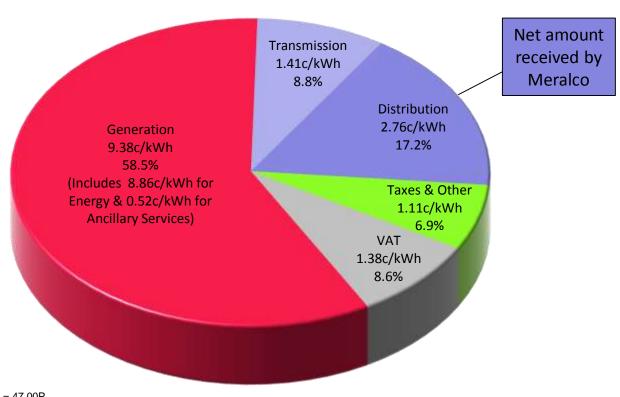


Meralco Tariff Composition (Jan 2016)



At 17% of the tariff, the Distribution Charge (which is the only part of the tariff claimed by Meralco) has declined by 22%, over the past 4 years

Weighted Average 16.03c/kWh (7.54P/kWh)



Note

- 1. US\$1 = 47.00P
- Data for Jan 2016. Weighted average based on customer splits (32% Residential; 41% Commercial: 27% Industrial)
- 3. Generation charge assumes all customers paying regulated generation charge
- 4. Transmission & Generation charges grossed up for Distribution Losses (ie. Charges for losses are added back to generation and transmission)
- 5. Ancillary services component of Transmission charge (assumed to be 27% of total) allocated back to Generation charge
- 6. Excludes special rate discounts

Summary of Answers: Tariff Comparison

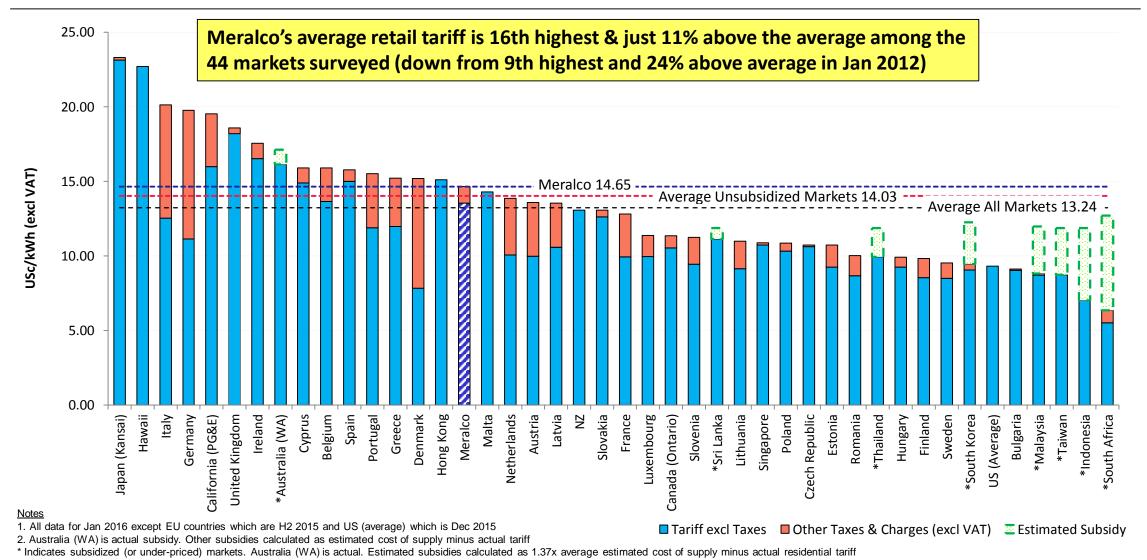
MERALCO

How do Meralco's rates compare with other countries?

- Meralco's weighted average retail tariff (14.65c/kWh excluding VAT but including all other statutory charges) ranks 16th and 11% above the average (vs. 9th highest & 24% above the average in 2012) among the 44 markets surveyed
- If subsidized markets are excluded, then Meralco's tariff is slightly higher than the average (14.03c/kWh)
- Meralco's Residential retail tariff (18.36c/kWh incl. VAT) ranks 21st and is almost at par with the average (vs. 10th highest & 22% above the average in 2012)
- Meralco's Commercial retail tariff (14.52c/kWh excl. VAT ranks 19th highest and 5% above the average (vs. 6th highest & 31% above the average in 2012)
- Meralco's Industrial retail tariff (12.48c/kWh excl. VAT) ranks 10th highest and 18% above the average (vs. 7th highest & 26% above the average in 2012)
- Meralco's regulated customers especially Residentials who have moved from 9th to 21st in the rankings and are now paying close to the global average rate - have experienced among the largest tariff declines of any market, during the past 4 years
- This is an excellent outcome for consumers, considering that the Luzon power market is unsubsidized and the majority of electricity is produced using imported fuel (or gas at partial import parity prices)

Average Electricity Tariffs¹ excl. VAT (44 Markets)





International Energy Consultants

Average Retail Electricity Tariff Summary (All Customers - USc/kWh)



Meralco's average³ retail tariff is 16th highest & just 11% above the average among the 44 markets surveyed (down from 9th highest and 24% above average in Jan 2012)

Change	in Rank	2016 Rank	2012 Rank	Country ²	2016 Tariff ¹	2012 Tariff ¹	Change in Tariff
1	3	1	4	Japan (Kansai)	23.32	24.48	-5%
1	1	2	1	Hawaii	22.70	32.88	-31%
1	1	3	2	Italy	20.14	25.49	-21%
1	2	4	6	Germany	19.78	22.20	-11%
1	22	5	27	California (PG&E)	19.54	15.42	+27%
1	14	6	20	United Kingdom	18.60	16.62	+12%
1	7	7	14	Ireland	17.56	18.62	-6%
1	3	8	11	Australia (WA)	16.14	19.93	-19%
1	4	9	5	Cyprus	15.91	24.31	-35%
1	7	10	17	Belgium	15.91	17.95	-11%
1	14	15	29	Hong Kong	15.10	12.88	+17%
1	7	16	9	Meralco	14.65	20.26	-28%
				Average (44 Markets)	13.24	16.37	-19%
1	2	21	23	NZ	13.08	16.18	-19%
1	12	23	35	France	12.82	11.95	+7%
1	9	25	34	Canada (Ontario)	11.36	12.08	-6%
1	15	27	12	Sri Lanka	11.13	19.49	-43%
1	19	29	10	Singapore	10.89	20.06	-46%
1	2	34	36	Thailand	9.93	10.45	-5%
1	1	38	39	South Korea	9.47	8.91	+6%
1	1	39	40	US (Average)	9.31	9.67	-4%
1	4	41	37	Malaysia	8.83	11.11	-20%
1	2	42	40	Taiwan	8.73	8.71	0%
1	2	43	41	Indonesia	7.03	8.51	-17%
	0	44	44	South Africa	6.36	8.14	-22%

^{1.}USc/kWh excluding VAT but including all other applicable taxes and charges.

^{3.}Weighted average based on customer splits (32% Residential; 41% Commercial: 27% Industrial)



^{2.}All data for Jan 2016 except EU countries which are H2 2015 and US (average) which is Dec 2015

Summary of Answers: Tariff Differential



What are the main factors driving differences between Meralco's tariffs and those in other countries?

Subsidies

- Several neighbouring countries (Thailand, Indonesia, Malaysia, Korea, Taiwan) have average tariffs that benefit from Government policies providing consumers with effective subsidies of up to 45%
- Subsidies are in the form of direct cash grants to the utility, as well as indirect support eg. low-cost fuel, cheap debt and deferred capital expenditure. IEC believes that providing subsidies via lower tariffs is bad economic policy and ultimately unsustainable. When subsidies are added back to retail tariffs, the true cost of electricity in these countries rises to a level that is much closer to that of Meralco

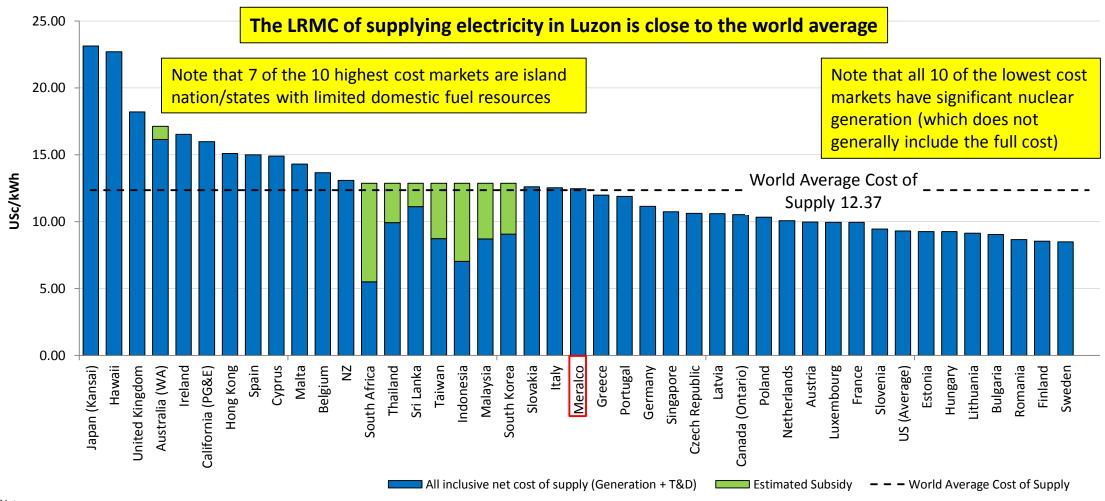
High cost of generation

- The estimated long-run marginal cost (LRMC) of supplying reliable electricity in Luzon (equal to the replacement or incremental cost
 of new generation capacity plus fuel and network charges) is almost equal to the average among the 44 markets surveyed
- Meralco's regulated tariff is currently above the LRMC of supply mainly because of the carrying cost of legacy PPAs (signed during the power crisis in the 1990s) which are significantly more expensive than the LRMC of new generation. Approximately 1900MW of these more expensive legacy PPAs will expire in 2025, and it is likely that they will be replaced by lower cost supply contracts which will significant reduce the regulated tariff
- More recently signed PSA's which now account for almost half of Meralco's supply are priced at close to or below the estimated LRMC for new generation. Procurement of these supply contracts at competitive prices has greatly assisted in price reductions
- Transmission and distribution charges in Meralco are significantly below the average cost of other markets which partly alleviates the high cost of generation



Cost of Supply (44 Markets)





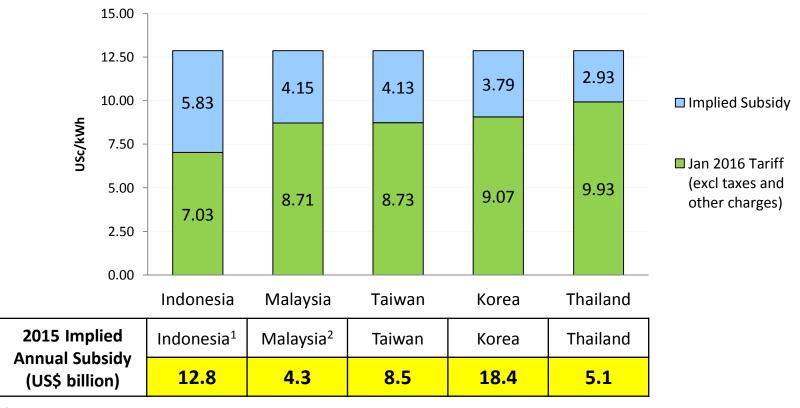
<u>Notes</u>

- . Net cost of supply calculated by removing all taxes from tariffs and adding back subsidies
- 2. Assumes tariffs in 50 US states and Europe are cost-reflective (ie. no subsidies)

Regional Comparison of Electricity Subsidies



- In 2015, estimated electricity subsidies for Indonesia, Malaysia, Taiwan, Korea and Thailand totaled over \$49 billion (down from \$88 billion in 2012)
- The average subsidy of these five countries is currently 4.2c/kWh or P1.96PkWh
- An equivalent subsidy would equate to a 26% reduction, if applied to Meralco's average tariff with an estimated cost of US\$1.7 billion or P79 billion in 2016³



<u>Notes</u>

- 1. Government of Indonesia cash subsidy to PLN in 2016 was \$5.4B
- 2. Estimated implied subsidy for Malaysia is for Peninsula only
- 3. Assumes 40,000GWh sales



Summary of Answers: Tariff Changes

How have Meralco's tariffs changed since the last survey four years ago and how do these changes compare with other markets?



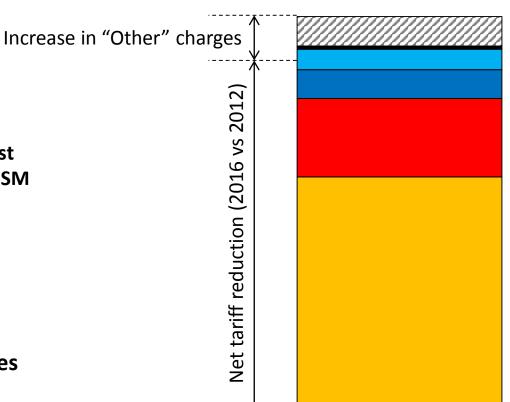
- Over the past 4 years, Meralco's customers have experienced some of the largest tariff reductions worldwide (vs. substantial increases in some of the neighbouring countries)
- Meralco's average tariff (excl VAT) has declined 28% (in US\$ terms) since Jan 2012 vs an average decline of 19% for the
 44 markets surveyed.
- Residential tariffs (incl VAT) have declined 31% in c/kWh (vs 15% all markets) & 25% in Pesos. This compares with a 7.5% increase in CPI in the period 2012-16
- Commercial tariffs (excl VAT) have declined 28% in c/kWh (vs 9% all markets) & 22% in Pesos
- Industrial tariffs (excl VAT) have declined 33% in c/kWh (vs 20% all markets) & 27% in Pesos
- Meralco's outsized tariff reductions have been substantially due to lower fuel prices (68% of the decline) which have been passed through to customers in full. (This reduction was generally not passed through to consumers in subsidized markets)
- Decreases in non-fuel generation charges (22% of the decline), transmission (6% of the decline), distribution charges (8% of the decline) and losses (1% of the decline) have also contributed to tariff reductions. Depreciation of the Peso has accounted for only 8% of the decline. The reduction in non-fuel generation charges is mainly due to Meralco's program of negotiating new Power Supply Agreements at competitive rates
- These reductions have been partly offset by increases in "other" charges eg. introduction of a Stranded Contract Charge
 (1.2% of total tariff) of and the Feed-in-Tariff Subsidy (0.25%) as well as an increase in the Missionary Electrification
 Charge (1.0%)



Contributions to Meralco's Tariff Reductions (2016 vs 2012)



- Major contributors to the tariff reduction over the past 4 years
 - **Fuel price decreases**
 - Lower non-fuel generation charges (mainly as a result of new lower-cost supply PSA contracts and lower WESM costs)
- Peso depreciation has had only a modest impact on the US\$ denominated tariff
- These reductions have been partly offset by increases in "other" charges eg. Stranded Contract Charge, FIT subsidy



8% Peso depreciation

1% Losses 6% Transmission (Peso)

8% Distribution (Peso)

22% Generation (Non-Fuel)

68% Generation (Fuel)

Summary of Answers: Tariff Changes

How have Meralco's tariffs changed since the last survey four years ago and how do these changes compare with other markets?



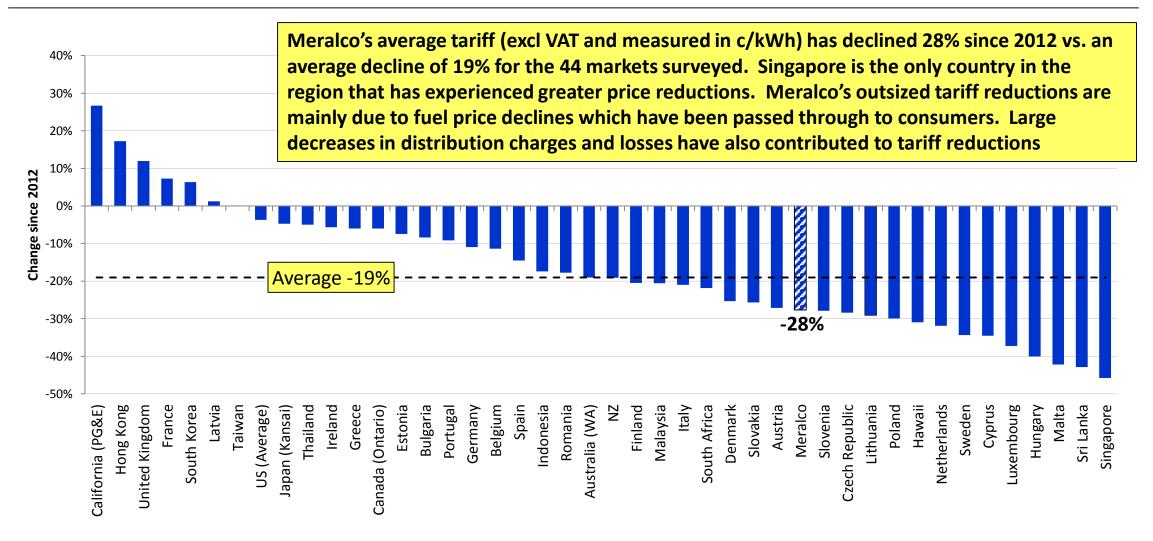
- Tariffs in many of the markets in the survey have moved significantly in both \$ and local currency terms and between customer categories, since the last survey in 2012
- 17 of the markets (including Meralco) have decreased their average rates by 25% or more (eg. Singapore 46%).
 7 markets managed to increase their tariffs over the same period (eg. California +27%)
- The reasons for the changes include one or more factors (sometimes moving in opposite directions):
 - Currency movement. A devaluation will make the local currency component of the tariff appear cheaper in US\$ terms eg. Australia tariff -19% in US\$ due mainly to a 33% fall in the A\$
 - Lower fuel costs eg. Singapore tariff -46% in US\$ due to a combination of 66% lower gas/LNG prices and a 21% lower currency
 - Change in regulated charges eg. California tariff +27% mainly as a result of annual increases in regulated rates.

 California did not benefit from lower fuel prices because it has minimal coal in its energy mix and natural gas prices did not decline over the period. Nor did it benefit from currency depreciation
 - Renewables eg. California, UK have increased their share of more expensive solar, wind and reduced the contribution of cheaper coal
 - Change in tariff schedules eg. Korea has increased its commercial and industrial tariffs by 17% & 25% respectively, and lowered its residential tariffs by 34%, whilst raising the average tariff by 6%
 - Change of taxation eg. Sri Lanka removed 15% VAT on electricity



Change in Average Electricity Tariffs (2016 vs 2012)





NB. Excludes VAT but includes other non-recoverable charges and taxes. Assumes regulated generation charge for all customers



Summary of Answers: Tariff Reasonableness

Are Meralco's tariffs fair & reasonable?

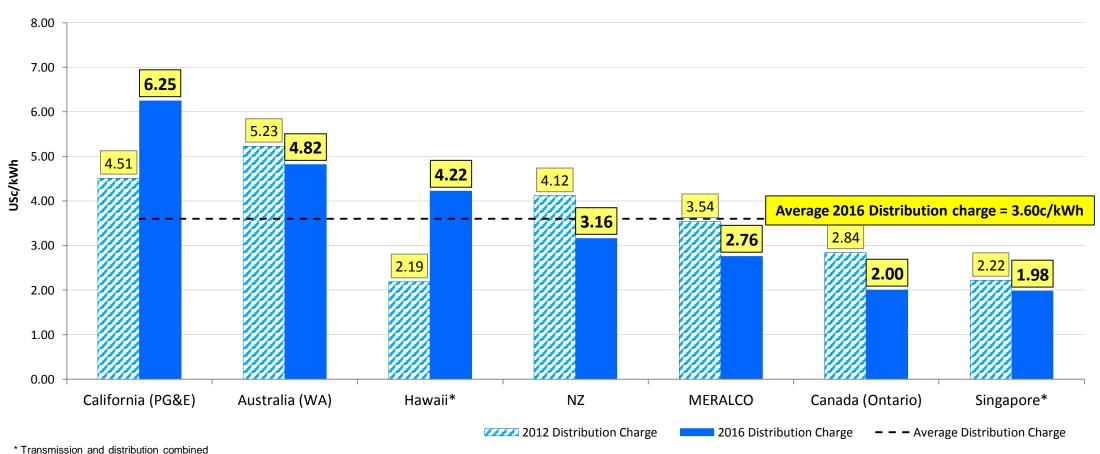


- The Generation Charge (9.38c/kWh = 59% of the total tariff) is somewhat higher than IEC's estimate of the LRMC of producing wholesale electricity in Luzon (8.29c/kWh). Meralco's relatively high cost of generation is mainly a function of the carrying cost of legacy PPA's (signed during the power crisis in the 1990's) which comprise c.50% of supply and which are more expensive than new PPA's available today. Over time, as these legacy PPAs expire and are replaced by cheaper supply options, the Generation Charge should begin to converge with the LRMC
- The Distribution Charge (2.76c/kWh = 17% of the total) is 27% (or 1.04c/kWh) <u>lower</u> than the average rate for the markets surveyed. On this basis, IEC judges that the charge is certainly fair and reasonable
- The Transmission Charge (1.41c/kWh = 9% of the total) is slightly lower than the average of the markets surveyed (1.59c/kWh). Given the geography of the network area and the cross-subsidy for non-Meralco customers, this charge is probably fair and reasonable
- Taxes and Other Charges (2.49c/kWh = 16% of the total) are lower than the average 21% of the 44 markets. Other Charges (7% of the total) are much lower than the average of 10% seen elsewhere and the VAT rate (9.4% effective) is lower than the 15.9% average rate in markets that have a VAT
- Considering all of these factors, IEC believes that on average Meralco's regulated customers are currently paying
 a fair and reasonable price for electricity. This assessment is supported by the fact that Meralco's average tariff is
 just 11% higher than the average of 44 markets, despite lack of subsidies and fundamentally high intrinsic supply
 costs

Comparison of Distribution Charges



In comparison with the six other markets in the survey, for which unbundled network costs were available, Meralco's Distribution Charge is 23% below the average (vs equal to the average in 2012)



Summary of Answers: Tariff Affordability



How affordable are Meralco's tariffs for its 5.3 million residential customers?

The average size (170kWh/month) household spent an estimated 4.5% of monthly disposable income on electricity in January 2016 (down from >6% in 2012)

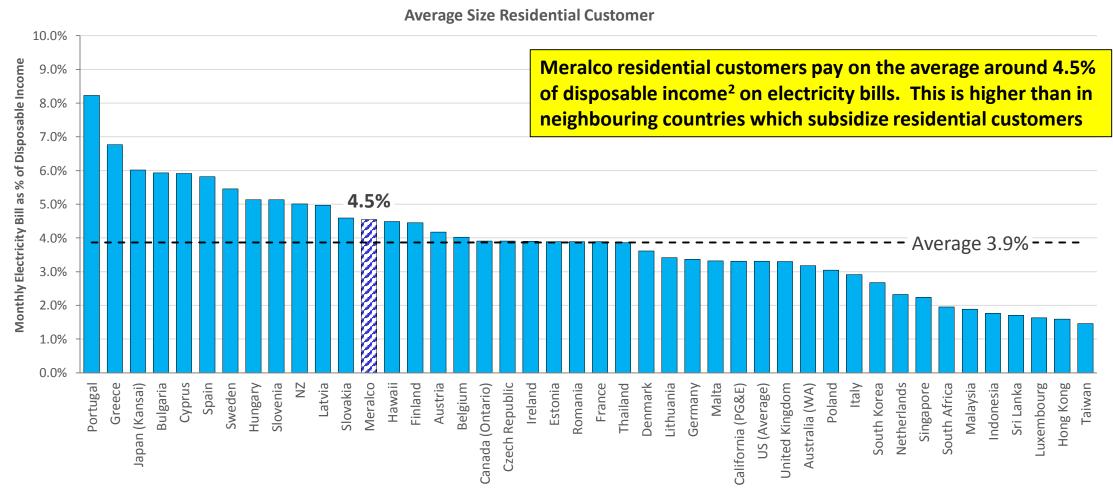
• Estimated disposable income: \$670 (P31590)

• Meralco bill: \$30.46 (P1410)

- The average spend of 44 markets surveyed was 3.9% ranging from a low of 1.5% in Taiwan to a high of 8.2% in Portugal
- Meralco's low income (P22,000/month) customers pay 3.1% vs. medium income (P100,000/month) customers who pay 5.3%
- Among Meralco's customers, electricity ranks 4th after food (50%), housing (20%) and transport (6%) on the list of household expenditure
- Although all consumers wish for lower monthly electricity bills, the actual amount spent is in line with global averages and represents a moderate fraction of the household spending

Comparison of Electricity as % of Disposable Household Income



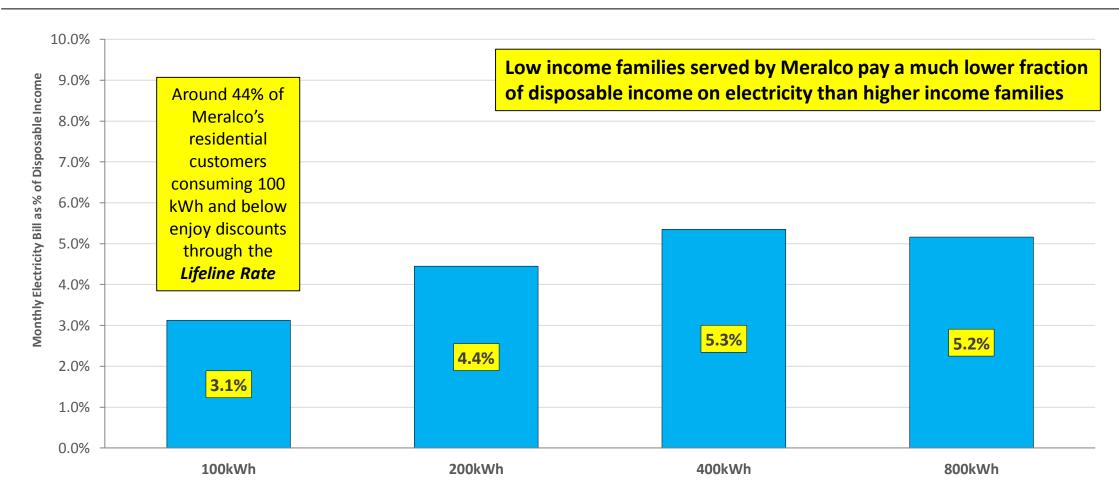


Notes

- 1. Tariff data for Jan 2016
- 2. Meralco area disposable income data based on 2012 Family Income and Expenditure Survey with deductions for compulsory contributions and income tax and escalated at 3% pa

Meralco Bill as % of Disposable Household Income



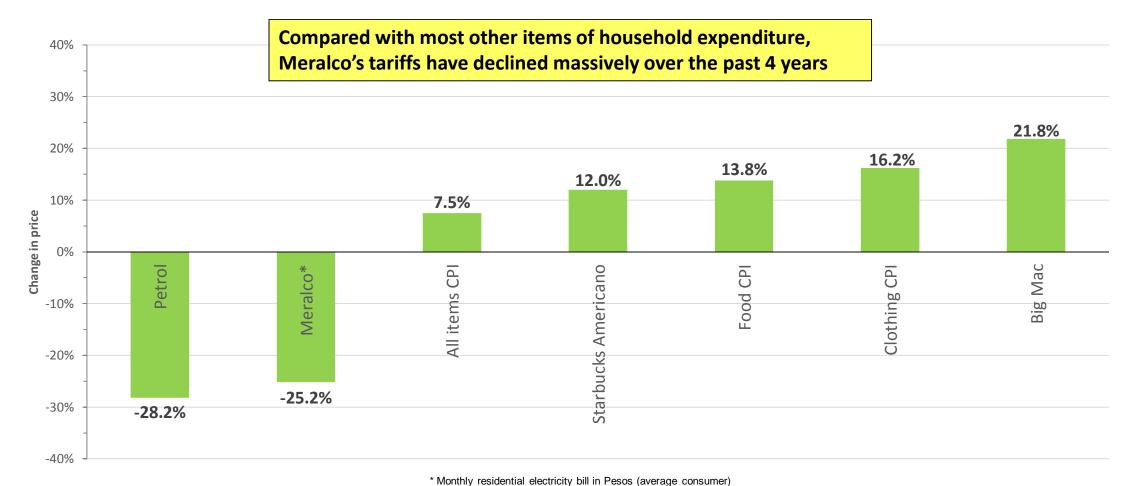


<u>Notes</u>

- 1. Tariff data for Jan 2016
- 2. Meralco area disposable income data based on 2012 Family Income and Expenditure Survey with deductions for compulsory contributions and income tax and escalated at 3% pa

Price Change of Consumer Goods in Metro Manila (2012 vs 2016)





Notes

- 1. All prices are in Pesos and include VAT
- 2. All data for Jan 2016 vs. Jan 2012
- 3. CPI data sourced from Philippines Statistics Authority
- 4. Petrol prices sourced from DOE. Based on Premium 95 unleaded average prices



Conclusions & Recommendations



- Over the past 4 years, Meralco's customers have enjoyed some of the largest tariff reductions worldwide (vs. substantial increases in some of the neighbouring countries)
- Meralco's average tariff (all customers, excl VAT) has declined 28% since Jan 2012 vs. an average decline of 19% in the survey. In local currency terms, Meralco's average tariff (excl VAT) has declined 22% vs. an average decline of only 1% across all markets
- Meralco's average tariff now ranks 16th out of 44 and 11% above the average of the survey (vs. 9th highest & 24% above the average in 2012). If subsidized markets are excluded, then Meralco's tariff is just 4% higher than the average
- Meralco's residential customers have experienced a 25% decline in their monthly bills vs a 7.5% increase in CPI, since 2012. Residential customers now pay close to the global average (vs. 15% above average in 2012) and now rank 21st out of 44 (vs 10th in 2012)
- This is an excellent outcome for consumers, considering that the Luzon power market is unsubsidized and the majority of electricity is produced using imported fuel
- Meralco's outsized tariff reductions are mainly due to fuel price declines (which are largely out of Meralco's control) but also to the addition of competitive power supply contracts to the generation portfolio and substantial decreases in distribution charges and system losses. Tariff reductions could have been larger, if they were not offset by higher statutory charges

Conclusions & Recommendations (cont'd)



- The Distribution Charge comprises 17% of the average tariff. (This is the only part of the tariff that accrues
 to Meralco. All other charges are collected by Meralco on behalf of third parties). The main component of
 Meralco's retail tariff is the Generation Charge (59% of total)
- Residential households spend 3-5% of their monthly income on electricity which is close to the average of 44
 markets and not a major item of expenditure
- The individual components of the regulated tariff are judged fair and reasonable, based on comparisons
 with other markets and the estimated replacement cost of electricity
- To ensure that Meralco holds or improves its position relative to tariffs in other markets, it is critical that
 regulators and legislators focus on facilitating investment in new generation to meet rapid demand growth
 and promote competition at the retail level