Consumer Metrics Part II

By Jackson Wang, P.Eng.
e-Radio Inc. Dec 20th, 2024

e-Radio™

Abstract

As CGE device capabilities and offerings expand, the need for SIMPLE metrics increases.

Independent metrics can help customers evaluate options, as well as help accelerate market acceptance and scale.

In this update to the original 2020 blog, a proposal of a real life 300Mile cost metric for Automobiles will be discussed. One number: Apples to Apples is the goal.

2020 Consumer Metrics Blog
Part I : review

https://sepapower.org/knowledge/designing-consumer-metrics-for-grid-connected-devices/

- Consumer centric metrics
- Tool to help consumer select products and services
- Don’t reinvent the wheel
- Objective: $, Reliability, Features, environmental impact, EPA metrics, etc.
- Subjective: $ value, ease of use, effectiveness, overall rating, etc.

What matters the most?

- A real-life story from GA 2015

California PSPS

https://oaklandside.org/2020/08/21/rolling-blackouts-oakland-caiso-flex-alerts/
(Why Oakland Ca gets power outages)

https://pasoroblespress.com/news/rolling-power-outages-possible-tonight-in-paso-robles/
(Paso Robles June 2021 news and urge consumers to curtail to avoid blackouts)

https://hackaday.com/2020/08/31/rolling-blackouts-in-california-again/
(Article and public forum on PSPS)

High costs of electricity in California

- https://www.publicadvocates.cpuc.ca.gov/-/media/cal-advocates-website/files/press-room/reports-and-analyses/241205-public-advocates-office-q3-2024-rates-report.pdf

(1/5 HH are behind in their elec bill !!)

- https://revel-energy.com/rising-electricity-costs/

(Utility rates rose ~3x CPI from 2014-2024)

- https://pv-magazine-usa.com/2024/11/08/are-californias-electricity-prices-rising-because-customers-are-installing-solar-panels/

(graph of avg residential rates from 2008-2024)

Sample Electric Utility Bills from around the continent (1, OH)

Messages

To avoid a 1.50% Late Payment Charge being added to your bill, please pay the **Amount Due** by the Due Date.

Your current **PRICE TO COMPARE** for generation and transmission from The Illuminating Company is listed below. In order for you to save money off of your utility's supply charges, a supplier must offer you a price lower than The Illuminating Company's price of 9.98 cents per KWH for the same usage that appears on the bill. To review available competitive supplier offers, visit the Public Utilities Commission of Ohio's "Energy Choice Ohio" website at www.energychoice.ohio.gov.

Residential Service - 1430038173 - 9.98 cents per KWH

The information below shows specific charges for the costs of energy efficiency, peak demand reduction, and renewable energy. These charges are not new, but are and previously were consolidated with other charges on your bill.

Energy Efficiency	1,063 KWH x 0.000000	$0.00
Peak Demand Reduction	1,063 KWH x 0.000000	$0.00
Renewable Energy	1,063 KWH x 0.001973	$2.10

Your next meter reading is scheduled to occur on or about Mar 28, 2024.

The Earned Income Tax Credit (EITC) is a tax credit for certain lower-income families and individuals. For information and to determine if you qualify, simply dial 800-829-1040, or visit irs.gov/individuals.

Additional messages, if any, can be found on back.

Usage History

Mar 23	786	Sep 23	650
Apr 23	968	Oct 23	568
May 23	604	Nov 23	644
Jun 23	694	Dec 23	987
Jul 23	615	Jan 24	1,117
Aug 23	564	Feb 24	1,354
		Mar 24	1,063

Account Summary — **Amount Due**

Previous Balance	194.50
Payments/Adjustments	-194.50
Balance at Billing on Mar 01, 2024	**0.00**
The Illuminating Company	79.47
NOPEC - NextEra Energy Services Ohio - Consumption	74.68
Total Current Charges	**154.15**
Total owed by Mar 15, 2024	**$154.15**

As an Automatic Credit Card Payment customer - Total charges of $154.15 will automatically be charged to your card account.

Usage Information for Meter Number 5002721998

Feb 27, 2024 KWH Reading (Actual)	30,324
Jan 29, 2024 KWH Reading (Actual)	29,261
KWH used	1,063

Charges From The Illuminating Company

Customer Number: 0805128482 1430038173
Rate: Residential Service CE-RSD

Customer Charge	4.00
Distribution Related Component	50.20
Economic Development Component	0.01
Cost Recovery Charges	26.28
Consumer Rate Credit	-1.02
Current Consumption Bill Charges	**79.47**

Charges From NOPEC - NextEra Energy Services Ohio

NOPEC
NEXTera ENERGY SERVICES

31360 Solon Rd., Suite 33, Solon, OH 44139
Customer Service: 1-855-667-3201
Account Number: 1002265278 Rate: GEN-F7025

Billing Period: Jan 29, 2024 to Feb 27, 2024

Basic Charge	1,063 KWH x	0.070250	74.68
Total NOPEC - NextEra Energy Services Ohio Charges			**74.68**

Detail Payment and Adjustment Information

02/05/24 Payment	-194.50

Account Balances by Company

	Previous Balance	Payments/ Adjustments	Current Charges	Amount Due
The Illuminating Company	99.38	-99.38	79.47	79.47
NOPEC - NextEra Energy Services Ohio	95.12	-95.12	74.68	74.68
Total	**194.50**	**-194.50**	**154.15**	**154.15**

$154.15/1063kWh =$.145 USD/kWh

Sample Electric Utility Bills from around the continent (2, MD)

Messages

To avoid a 1.50% Late Payment Charge being added to your bill, please pay the **Amount Due** by the Due Date.

Generation, Transmission & Energy Cost Adjustment Price Comparison Information: The current price for Standard Offer Service (SOS) electricity is 9.886 cents/kWh, effective through May 31, 2025. The weighted average price of SOS electricity will be 9.774 cents/kWh through May 31, 2025. The price for SOS from June 1, 2025, through May 31, 2026, will be set in January 2025.

Your next meter reading is scheduled to occur on or about Dec 23, 2024.

Because you are participating in the Maryland Community Solar program, your bill may include Community Solar credits. These credits will appear as "Community Solar ID" under the "Usage Information" section of your bill. Please contact your Subscriber Organization if you have questions regarding these credits.

Rockdale Solar LLC 844-899-9763

For a detailed explanation of how to read your bill, visit www.firstenergycorp.com/PEBill

The EmPOWER MD charge funds programs that can help you reduce your energy consumption and save you money. For more information, including how to participate, go to: www.energysavemd.com.

Best wishes for a joyous holiday season from all of us at Potomac Edison.

Account Summary	Amount Due
Previous Balance	46.72
Payments/Adjustments	-46.72
Balance at Billing on Nov 27, 2024	**0.00**
Potomac Edison - Consumption	**53.74**
Amount Due by Dec 17, 2024	**$53.74**
Usage Information for Meter Number	
Nov 22, 2024 KWH Reading **(ESTIMATE)**	3,469
Oct 23, 2024 KWH Reading (Actual)	2,039
Kilowatt Hours Metered	1,430
Oct 23, 2024 Banked KWH Credit	0
Community Solar ID 5001486092 Credit	1,076
Nov 22, 2024 Banked KWH Credit	0
KILOWATT HOURS BILLED	354
Charges From Potomac Edison	
Customer Number:	
Rate: Residential Service PE-RSRF	
Generation Charge	32.93
Transmission Charge	1.40
Customer Distribution Charge	6.00
Distribution Charge	8.10
Electric Universal Service Fee	0.32
Energy Cost Adjustment	0.67
Administrative Credit	-0.68
CoGeneration PURPA Project Termination Agreement Surcharge	2.32
Franchise Tax	0.22
EmPower MD Surcharge	2.41
MD Environmental Surcharge	0.05
Current Consumption Bill Charges	**53.74**
Detail Payment and Adjustment Information	
11/07/24 Payment	-46.72

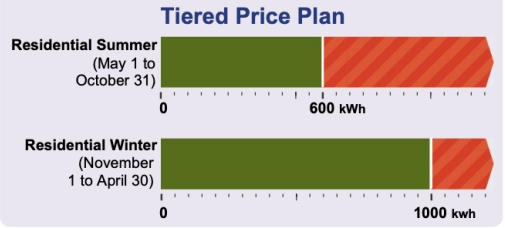
$53.74/354kWh=$.15 USD/kWh

Sample Electric Utility Bills from around the continent (3, ON Tier price)

Point of Delivery: 91795692 — Residential - Medium Density

Electricity	$73.47
This is the cost of generating the electricity you used this period. Usage is measured in kilowatt-hours (kWh) and depends on the wattage of devices you use and how long you use them. The Ontario Energy Board (OEB) sets the cost per kWh and the **money collected goes directly to the electricity generators**.	
Delivery	$60.53
This is the cost of ensuring you have reliable power when you need it. **Hydro One collects this money** to build, maintain and operate the electricity infrastructure, which includes power lines, steel towers and wood poles covering 960,000 sq. km. A portion of this cost is fixed and a portion varies depending on the amount of electricity used.	
Regulatory Charges	$4.77
The Independent Electricity System Operator (IESO) uses this money to manage electricity supply and demand in the province, which is necessary to ensure that there is enough electricity to meet Ontario's needs at all times.	
HST (87086-5821-RT0001)	$18.04
Ontario Electricity Rebate	−$26.78
Total of your electricity charges	**$130.03**

Feb 13/24 to Mar 14/24	Usage (kWh)	Rate (¢)	Amount
Tier 1	713.3484	10.3	$73.47



Meter Number	Current Reading	Previous Reading	Difference	Usage in kWh
J3559917	Mar 14/24 84717.6048	Feb 13/24 84004.2564	713.3484	(x1) = 713.3484

$130/713kWh=
$.18 CAD/kWh or
$.129 USD/kWh

Sample Electric Utility Bills from around the continent (4, ON TOU)

Residential Service

Your Electricity Charges

Electricity

Electricity distributed by TORONTO HYDRO

Time of use - Summer	
130.051 kWh On-peak (Highest Price) @ $0.182 / kWh	23.67
132.321 kWh Mid-peak (Mid Price) @ $0.122 / kWh	16.14
500.779 kWh Off-peak (Lowest Price) @ $0.087 / kWh	43.57
Delivery	69.43
Regulatory	4.91
Your Total Electricity Charges	**157.72**
H.S.T. (H.S.T. Registration 896718327RT0001)	**20.50**
Ontario Electricity Rebate	**30.44 CR**
Your Previous Charges	
Amount of last bill	201.01
Payment Received Aug 02 2024 - Thank You	201.01 CR
Balance Forward	**0.00**
Total Amount Due by Sep 05 2024	**$147.78**

$147.78/785kWh=
$.188 CAD/kWh
$.134 USD/kWh
USD

Sample Electric Utility Bills from around the continent (5, PG&E EV2A TOU)

Rate Schedule: EV2A Home Charging

12/08/2023 – 12/31/2023

Energy Charges				
Peak	103.102900	kWh	@ $0.46357	$47.80
Part Peak	54.813700	kWh	@ $0.44687	24.49
Off Peak	651.317900	kWh	@ $0.27818	181.18
Generation Credit				-107.36
Power Charge Indifference Adjustment				2.71
Franchise Fee Surcharge				0.89

01/01/2024 – 01/07/2024

Energy Charges				
Peak	42.906600	kWh	@ $0.53002	$22.74
Part Peak	20.559700	kWh	@ $0.51332	10.55
Off Peak	181.230500	kWh	@ $0.34462	62.46
Generation Credit				-37.65
Power Charge Indifference Adjustment				2.65
Franchise Fee Surcharge				0.29

Total PG&E Electric Delivery Charges **$210.75**

2016 Vintaged Power Charge Indifference Adjustment

Total Usage	1,053.931300 kWh
Serial	N
Rotating Outage Block	6D

12/08/2023 – 01/07/2024

Rate Schedule: E-EV2-A

Generation - Off Peak - Winter	832.548400	kWh	@ $0.11573	$96.35
Generation - Part Peak - Winter	75.373400	kWh	@ $0.13803	10.40
Generation - On Peak - Winter	146.009500	kWh	@ $0.14990	21.89
			Net Charges	128.64
Energy Commission Surcharge				0.32

Peninsula Clean Energy is your community's official electricity provider.
You are receiving clean electricity at low rates!

Total Peninsula Clean Energy Electric Generation Charges **$128.96**

$339.71/1053kWh
$.32 USD/kWh

Sample Electric Utility Bills from around the continent (6, PG&E EV2A TOU)

Rate Schedule: EV2A Home Charging

02/13/2024 – 02/29/2024

Energy Charges				
Peak	49.936500	kWh	@ $0.53002	$26.47
Part Peak	20.953800	kWh	@ $0.51332	10.76
Off Peak	116.376900	kWh	@ $0.34462	40.11
Generation Credit				-29.54
Power Charge Indifference Adjustment				2.03
Franchise Fee Surcharge				0.22

03/01/2024 – 03/13/2024

Energy Charges				
Peak	35.791400	kWh	@ $0.53117	$19.01
Part Peak	19.251900	kWh	@ $0.51447	9.90
Off Peak	121.467400	kWh	@ $0.34578	42.00
Generation Credit				-27.51
Power Charge Indifference Adjustment				1.99
Franchise Fee Surcharge				0.21

Total PG&E Electric Delivery Charges **$95.65**

2016 Vintaged Power Charge Indifference Adjustment

Total Usage	363.777900 kWh
Serial	S
Rotating Outage Block	7R

02/13/2024 – 03/13/2024

Rate Schedule: E-EV2-A

Generation - Off Peak - Winter	237.844300	kWh	@ $0.11573	$27.53
Generation - Part Peak - Winter	40.205700	kWh	@ $0.13803	5.55
Generation - On Peak - Winter	85.727900	kWh	@ $0.14990	12.85
			Net Charges	45.93
Energy Commission Surcharge				0.11

Peninsula Clean Energy is your community's official electricity provider.
You are receiving clean electricity at low rates!

Total Peninsula Clean Energy Electric Generation Charges **$46.04**

$141.69/363kWh=
$.39 USD/kWh

Sample Electric Utility Bills from around the continent (7, PG&E TOU)

Rate Schedule: Time-of-Use (Peak Pricing 4 - 9 p.m. Every Day)

02/08/2024 – 02/29/2024

Baseline Allowance	165.00	kWh	(22 days x 7.5 kWh/day)	
Energy Charges				
Peak	83.437000	kWh	@ $0.51536	$43.00
Off Peak	224.053000	kWh	@ $0.48701	109.12
Baseline Credit	165.000000	kWh	@ -$0.10556	-17.42
Generation Credit				-50.60
Power Charge Indifference Adjustment				2.06
Franchise Fee Surcharge				0.38

03/01/2024 – 03/10/2024

Baseline Allowance	75.00	kWh	(10 days x 7.5 kWh/day)	
Energy Charges				
Peak	33.622000	kWh	@ $0.51678	$17.38
Off Peak	98.146000	kWh	@ $0.48843	47.94
Baseline Credit	75.000000	kWh	@ -$0.10607	-7.96
Generation Credit				-21.69
Power Charge Indifference Adjustment				0.94
Franchise Fee Surcharge				0.16

Total PG&E Electric Delivery Charges **$123.31**

2020 Vintaged Power Charge Indifference Adjustment

Total Usage	439.258000 kWh
Baseline Territory	T
Heat Source	B - Not Electric
Serial	P
Rotating Outage Block	50

02/08/2024 – 03/10/2024

Generation - Peak - Winter	117.059000	kWh	@ $0.18300	$21.42
Generation - Off Peak - Winter	322.199000	kWh	@ $0.09900	31.90
Energy Commission Tax				0.13

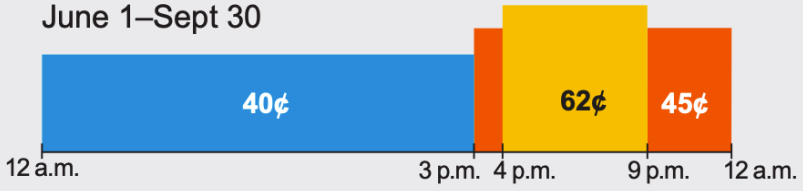
Total Central Coast Community Energy Electric Generation Charges **$53.45**

$176.76/439kWh
$.40 USD/kWh

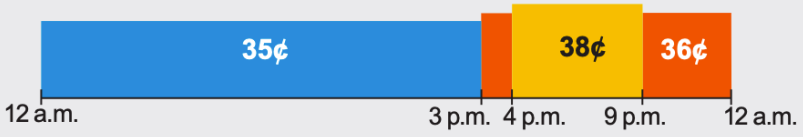
Electric Home Rate Plan (E-ELEC)*

pge.com/electrichome

Summer Season
June 1–Sept 30



Winter Season
Oct 1–May 31

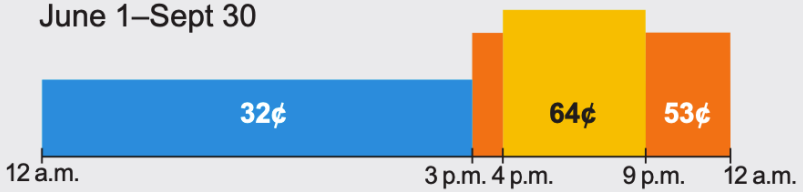


Electric Vehicle (EV) Rate Plans

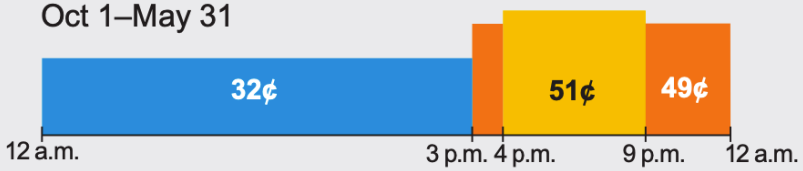
pge.com/evrates

Home Charging EV2-A

Summer Season
June 1–Sept 30

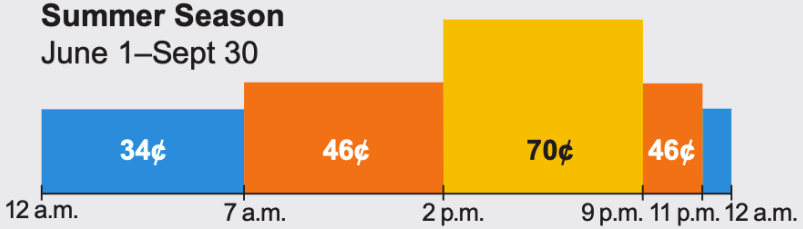


Winter Season
Oct 1–May 31

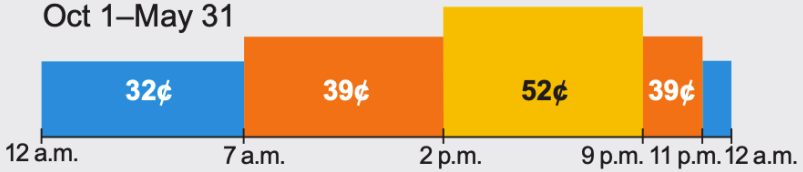


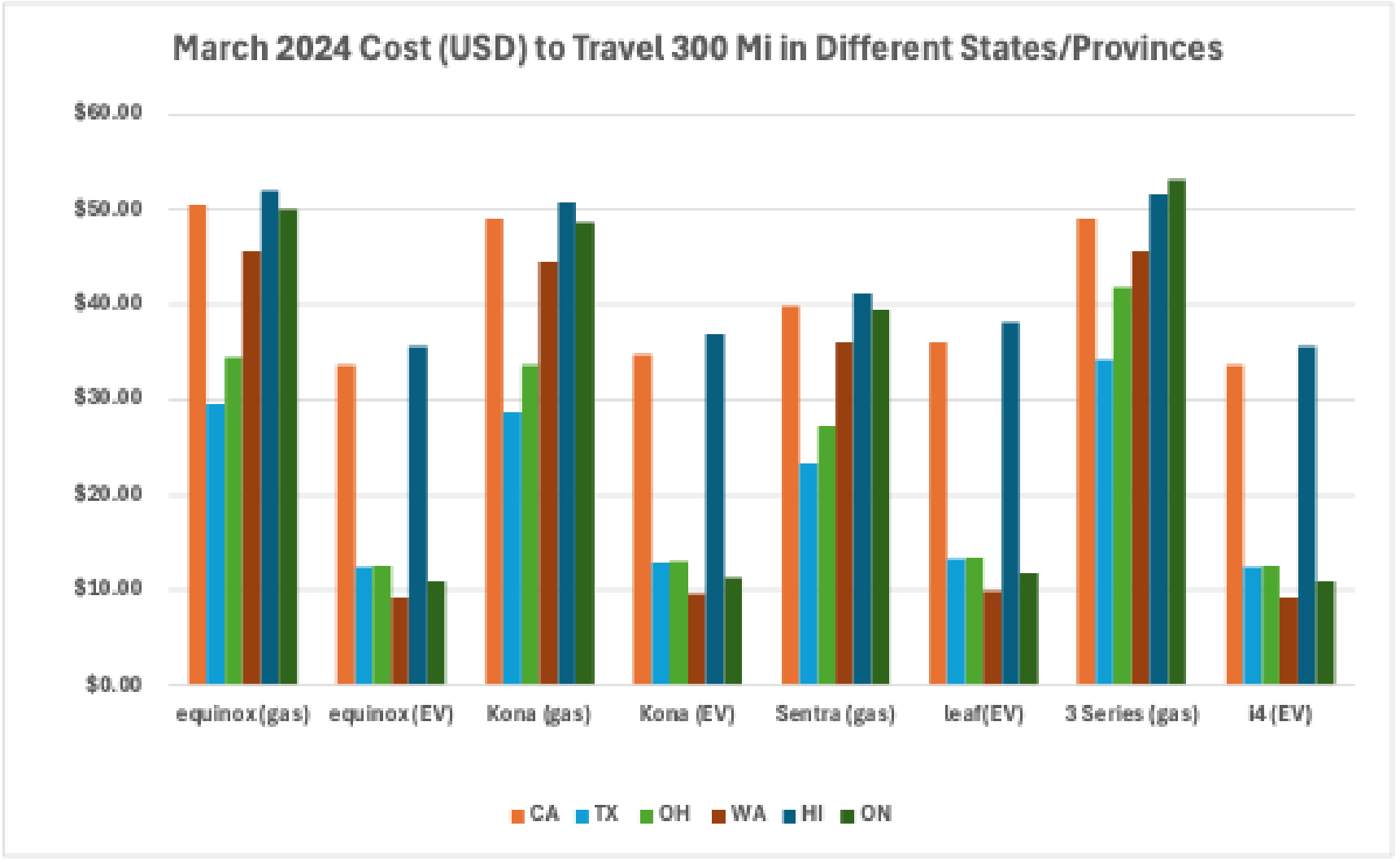
Electric Vehicle Rate Plan EV-B

Summer Season
June 1–Sept 30



Winter Season
Oct 1–May 31




March 2024 Cost (USD) to Travel 300 Mi in Different States/Provinces
$60.00
$50.00
$40.00
$30.00
$20.00
$10.00
$0.00
equinox (gas)
equinox (EV)
Kona (gas)
Kona (EV)
Sentra (gas)
leaf (EV)
3 Series (gas)
i4 (EV)
CA
TX
OH
WA
HI
ON

Notes

- Electric utility bills are much more complex to calculate for 300M than Gas, $/gal x 300/MPG
  - (30 MPG is common)
- Total bill/kWh to $/kWh x 300/MP(kWh)
  - (3 MP(kWh) is common)
- Where you live matters more than what you drive
- Electric fuel should be cheaper by 3x as electric motors 3x more efficient than ICE and no road taxes YET for now
- TOU diligence can pay off, can make 25% or more difference in some cases

https://www.cpuc.ca.gov/about-cpuc/divisions/news-and-public-information-office/public-advisors-office/consumer-choices-in-california
https://www.fueleconomy.gov,
https://www.eia.gov/electricity/sales_revenue_price/pdf/table_5A.pdf

Next Steps

- This project was a “back of envelope” calculation using proxy methods
- Suggest EPA, DOE and Consumer groups etc. take up this 300M metric for consumers
- Effort requires GIS overlay of local electricity & gas pricing + EPA fuel economy database
- Metrics can be international, eg. 500km in USD or Euros etc.
- Proposed 300M Metrics is ONE number and is Apples to Apples, ie. How much $ (One number) for fuel costs ONLY to travel 300M in USD.

Contact info:

Jackson Wang, P.Eng.

CTO, e-Radio USA Inc.

Jwang@e-radioinc.com

+1 415 271 0927 (ph)

www.e-radioinc.com

e-Radio™