

**Ken James**

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To: bcuc

TO THE CHAIR AND MEMBERS OF THE BC UTILITIES COMMISSION

I write today to express my concerns and offer my observations of the Site C Hydro Project. I believe the following points are relevant to your current review of the financial viability of the Site C project.

#### FUTURE DEMAND

Annual economic growth is currently running at 3% to 4% and annual population growth is running at 1% or more. Based on the above core factors it is PRIMA FACIE (ref A ) that the 1.1 MW capacity and 5.1 GWh annual output will be needed by the mid 2020's. I note from p. 105/106 of the 2017 BC Hydro Annual Report that Site C represents 8.8% of its domestic 2017 sales and 9.3% of its 2017 production from existing hydro resources. I further note that Site C is a 9 year project that commenced in 2015 with completion scheduled for 2024 seven years from now (Ref B). Considering the 40 years of analysis and review leading up to this project it is PRIMA FACIE for the nay sayers to prove that this project is not required or that there is some other project(s) that are viable substitutes.

This process of course is fraught with politics. Andrew Weaver leader of the Green Party and effectively controlling the balance of power in the Legislature and George Heyman Minister of the Environment in the current NDP government and the former Executive Director of the Sierra Club of B C both hold positions of significant power and influence. They are both on the record in their personal web sites and articles in the Georgia Straight etc. opposing Site C as too expensive and not needed instead favoring conservation and distributed energy as the solution (ref C ).

#### POWER RATES IN JURISDICTIONS WHERE DISTRIBUTED ENERGY CONCEPTS ARE WELL ADVANCED

##### FIRST CASE STUDY

Using actual empirical evidence I compared 3 actual power bills. A local Bill which is for a large rancher in Richmond. Also included is the bill for a 2 bed/2bath condo in Kihei Maui and a bill for a suburban ranch house with granny flat in Wannaroo a suburb of Perth Australia. Perth and Kihei are in the forefront of the distributed energy concept and have seen significant increases in power rates while saving many tons of CO2 by replacing coal and oil fired electrical generation with solar PV/solar hot water and wind. This comes with a considerable cost of about 3 times what we pay here in B C for a kilowatt hour of power. ( See attached Schedule #1 )

This is what I call the layering effect of adopting Green intermittent power to replace dispatchable carbon intensive legacy power. These jurisdictions are paying for both systems and only saving the fuel costs of the legacy system displaced. It is PRIMA FACIE that we will not be saving any CO2 as our legacy system is carbon free in operation and CO2 equal as to the carbon associated with building and installing PV and Wind Systems. So??????

Distributed Energy (ref C ) is an early adopter concept that is not ready for prime time at our latitude or in our Climatic Zone.

You also might want to ponder the rather Draconian peak Power tariff ( to kill peak power demand in Perth Australia which is facilitated by Smart Meters as a method to curtail peak demand and to encourage the sale of Tesla Power Walls at 52 cents AUS per KWh with 10% GST. Ie sock it to the rate payers.

## SECOND CASE STUDY

This is an analysis of Wind Power on the Island of Maui in the state of Hawaii. Maui Electric Company buys all the available production from 2 independent wind power producers Kaheawa Wind Power and Auwahi Wind (Sempra Renewables). These are 20 year contracts approved by the Hawaii Public Utilities Commission where the feed in rate to be paid is 19 cents per kilowatt hour (That's \$190 USF per MWh or \$238 Cdn). (See Attached Schedule 2)

The 51MW Kaheawa farm in the west mountains is comprised of 34 1.5 MW GE units operating at 43% efficiency producing some 192 GWh per year. The 21MW Auwahi farm operates on the slopes of Haleakala is comprised of 8 (currently 7 due to a catastrophic failure of one unit). These Seimens 3MW units also operate at a 43% efficiency.

As noted above the Hawaii Public Utilities Commission has approved the economic life span of these units at 20 years (not 70 years like Hydro). On Maui wind power is neither cheap nor long lived as it is apparent the units will need to be replaced every 20 to 25 years.

See also the schedule (Schedule 3 ) where I scale the costs of the 51 MW/192 GWh Kaheawa Wind farm to the 1,100MW 5,100 GWh Site C Project for comparison purposes.

### CAPITAL COSTS ASSOCIATED WITH SITE C, CANCELLATION COSTS AND COSTS OF WIND AS AN ALTERNATIVE

Site C has a capital cost currently estimated at \$8,900,000,000 (Ref B) that is incurred now, presumable 100% financed by debt, to be written off over some 50 or 70 years and presumably financed over the same time period.

The option to cancel Site C I have assumed would add up to \$2,500,000,000 when all is said and done. This figure under GAAP would require an immediate write off but would in all likelihood be financed and paid off over 20 to 25 years. The rate payers would have to absorb this in their bills and get absolutely nothing for it.

The model I have constructed (Schedule 3) would indicate that 5,100 GWh of wind farm power substitute power would cost \$5,000,000,000 and would need to be replaced with new units every 20 to 25 years. They must therefore have their costs amortized over 20 to 25 years not 50 to 70 years. Thus leading to a substantially higher annual cost to be absorbed by the rate payers.

See Schedule 4 (capital costs only no interest) comparing the annual amortized cost of each option. As you will see the cost over the next 20 to 25 years clearly favour completion of the Site C project.

See Schedule (Capital cost as well as the interest cost of the related debt) comparing the annual cost of each option. My amortization tables indicate a competitive cost of less than 10 cents a kilowatt or a one cent increase when blended with other 90% of supply.

With respect to the cost aspects of Site C consistent with my Schedules the cost of amortizing the project over 70 years would be \$305,000,000 per year or \$344,000,000 per year if financed over 50 years. Revenues would be \$510,000,000 per year if the feed in rate to the grid was set at 10 cents per KWh or \$100 per MWh and if prorated over all power sales would represent an additional 1 cent per KWh.

With respect to cancelling the project if all in cost totalled \$2,500,000,000 when all is said and done. This would be a sunk cost, it is money spent and debt incurred that if paid off over 20 years would be \$167,000,000 per year or over 25 years \$143,000,000 per year to be recovered from rate payers. This would be in addition to the cost of installing alternate sources of power. In my example 5,100 GWh of intermittent wind power would cost over \$333,000,000 per year for 20 years and would need to be replaced with new units at the end of each 20 year period and refinanced. Ditto \$285,000,000 per year if this were done every 25 years for intermittent power which is not dispatchable power.

## AMORTIZATION OF DEBT (Schedule 5)

It is assumed in my modeling that debt amortization will equal the assumed amortization period for the assets or the sunk costs. The 2017 BC Hydro Annual Report note 16 Long Term Debt indicates 20 year bonds are available at 2.5% . I have used 3% interest, quarterly blended payments of interest and principal and the borrowing will be equal to the cost of the asset acquired or the sunk cost written off.

All loan amounts are based on \$1,000,000 of borrowing and multiplied by the number of \$millions borrowed

For Site C	8,900 times
For Wind Farms	5,000 times
For Sunk Costs	2,500 times.

## CONCLUSIONS

The mere fact of the need to write off the sunk costs over 20 to 25 years verses 50 to 70 years against a long life productive asset makes cancellation significantly more expensive when that annual cost is added to the cost of any substituted power project to replace Site C

Wind Farms are intermittent power not dispatchable power.

Site C is still a competitive project and even more so when you weigh the costs of a \$2,500,000,000 sunk cost write off that won't go away unless it is paid off.

Respectfully submitted

Ken James CPA,CA

Richmond BC

# pri·ma fa·ci·e

/ˌpɹɪmə ˈfɑːʃiː/

adjective & adverb LAW

based on the first impression; accepted as correct until proved otherwise.  
"a prima facie case of professional misconduct"

Feedback

Translations and more definitions

## Prima facie - Wikipedia

[https://en.wikipedia.org/wiki/Prima\\_f...](https://en.wikipedia.org/wiki/Prima_facie)

In common law jurisdictions, prima facie denotes evidence that, unless rebutted, would be sufficient to prove a particular proposition or fact. The term is used similarly in academic philosophy.

Burden of proof

Res ipsa loquitur

Use in academic philosophy

Other uses and references

## Prima Facie | Definition of Prima Facie by Merriam-Webster

<https://www.merriam-webster.com/prim...>

Legal Definition of prima facie. : sufficient to establish a fact or case unless disproved prima facie proof a prima facie showing.

## Prima facie legal definition of prima facie - Legal Dictionary - The Free Dictionary

[legal-dictionary.thefreedictionary.com/...](https://legal-dictionary.thefreedictionary.com/...)

Prima Facie. [Latin, On the first appearance.] A fact presumed to be true unless it is disproved. In common parlance the term prima facie is used to describe the apparent nature of something upon ...

Ref A  
10/1

Sep 12, 2016

## Fact sheet: Site C Clean Energy project

### The project

- Site C Clean Energy Project is a third dam and hydroelectric generating station under construction in northeast B.C., about seven kilometres southwest of the City of Fort St. John.
- The project is being built to meet future electricity needs in B.C. by providing **1,100 megawatts** of dependable capacity, and generating about **5,100 gigawatt hours** of energy each year – enough to power the equivalent of 450,000 homes per year.
- As the third project on one river system, Site C will use water already stored behind the existing W.A.C. Bennett Dam in the Williston Reservoir to generate about **35 per cent** of the Bennett Dam's energy, with **only five per cent** of the reservoir area.
- Site C will have among the **lowest greenhouse gas emissions**, per gigawatt hour, compared to other electricity-generation options.
- A provincewide poll in April 2016 found broad support for Site C. Almost three-quarters (73%) of British Columbians either support Site C (49%) or can support it under certain circumstances (24%), while 25% oppose the project.

### Cost estimate

- **\$8.335 billion**, plus a project reserve of **\$440 million** held by the Treasury Board to account for events outside of BC Hydro's control (e.g., higher than forecast inflation or interest rates).

### Approvals

- The Site C project received an **Environmental Assessment Certificate** from the B.C. government on October 14, 2014.
- The project received a **Federal Decision Statement** from the federal government on October 14, 2014 (re-issued November 25, 2014).
- The B.C. government announced a positive **final investment decision** for Site C on December 16, 2014.

### Construction

- The construction of Site C started in July 2015 and will be completed in 2024.

### Employment

- **1,721 people** are working on the Site C project, as of July 2016.

RFB  
1/10/13

# INFORMATION SHEET

## COST ESTIMATE FOR SITE C

In 2011, the cost estimate for the Site C Clean Energy Project was updated to reflect the upgraded project design, and current market prices for labour, equipment and materials.

Site C would have an estimated capital cost of \$7.9 billion (a detailed cost breakdown is shown on the following page). It would produce electricity at a cost between \$87 and \$95 per megawatt hour at the point of interconnection, based on a real discount rate from 5.5 to 6 per cent. This would make Site C among the most cost-effective resource options to help meet B.C.'s future electricity needs.

Like other large hydro projects, Site C would have an upfront capital cost, followed by low operating costs and a long life of more than 100 years.

### Site C and BC Hydro Rates

There is no effect on today's BC Hydro rates from Site C, as costs are deferred until the project begins generating electricity. This ensures that the costs for Site C are paid by the ratepayers who are benefiting from the project.

BC Hydro is committed to keeping rates competitive. To reduce the rate impact on customers, BC Hydro anticipates that the costs for Site C would be amortized over a long period. This amortization period and rate impact would be determined through a future regulatory process with the British Columbia Utilities Commission.

### Economic Development

Site C is estimated to create approximately 10,000 direct jobs during construction, and approximately 33,000 total jobs through all stages of development and construction. It is estimated that the construction of Site C would contribute \$3.2 billion to provincial gross domestic product. The project would provide significant business opportunities for small, medium and large businesses, including northern and Aboriginal businesses.

Once in operation, Site C would contribute revenues to the local and provincial governments through water rentals, grants-in-lieu and other taxes, in addition to providing benefits to Peace region communities and First Nations, where appropriate.

### GOVERNMENT REVIEW OF BC HYDRO

In June 2011, a report by a government-appointed panel concluded that: "Site C is a reasonable cost alternative to meet load growth."

The panel noted that: "Site C is seen as cost effective, as the cost of energy, at \$87-95 per MWh, compares favourably with other benchmarks for clean energy."

The report is available at: [www.newsroom.gov.bc.ca/downloads/bchydroreview.pdf](http://www.newsroom.gov.bc.ca/downloads/bchydroreview.pdf).

## COST ESTIMATE FOR SITE C

-2-

### PROJECT COST BREAKDOWN

Site C has an estimated capital cost of \$7.9 billion, and it would have low operating costs over its lifespan of more than 100 years. The breakdown of the project cost estimate is below.

PROJECT COST ESTIMATE BREAKDOWN	Cost Estimate \$millions
<b>Dam and Associated Structures</b>	\$ 1,790
Earthfill Dam	
Approach Channels and RCC Buttress	
Spillway, Intakes and Penstock	
Left (North) Bank Stabilization	
Cofferdams, Dikes and Diversion Tunnels	
<b>Power Facilities</b>	\$ 990
Powerhouse and Switchgear Building	
Stations and Transmission	
<b>Offsite Works</b>	\$ 530
Highway 29 Relocation, Access Roads, Clearing, Land and Rights	
<b>Construction Management and Services</b>	\$ 515
Worker Accommodation	
Construction Management and Construction Services	
<b>Total Direct Construction Costs</b>	\$ 3,825
<b>Indirect Costs</b>	\$ 1,005
Development Costs	
Regulatory Costs	
Construction Insurance	
Project Management and Engineering	
Mitigation and Compensation	
<b>Contingency (18% on direct costs, 10% on indirect costs)</b>	\$ 730
<b>Total Construction and Development Costs (real dollars)</b>	\$ 5,560
<b>Inflation</b>	\$ 790
<b>Interest During Construction</b>	\$ 1,550
<b>Total Construction and Development Costs (nominal dollars)</b>	\$ 7,900

A preliminary forecast of anticipated operating costs for the planning life of the project is below.

ANNUAL OPERATING COSTS	Cost Estimate F2011 millions*
Water Rentals	\$ 40.2
Grants-in-Lieu and School Taxes	\$ 2.6
Operations and Maintenance Costs	\$ 7.5
Annualized Sustaining Capital	\$ 9.3

\* Levelized cost per year

Site C requires environmental certification and other regulatory permits and approvals before it can proceed to construction. In addition, the Crown has a duty to consult and, where appropriate, accommodate Aboriginal groups.

More information on Site C can be found at: [www.bchydro.com/sitec](http://www.bchydro.com/sitec).

- Apple
- Bing
- Google
- Yahoo
- Autoline - Automotive news, re...
- BC Hydro - MyHydro Log in
- Outlook Web App
- BC News Videos | Watch New...
- Vancouver Historical Total Pre...
- Favorites
- Land Rover Range Rover Sport...

Edit



distributed power ✕

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APC® Power Management - Reliable Power Filtering - apc.com

[www.apc.com/power](http://www.apc.com/power)

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Types: Air Economizer, APC RBC, Smart UPS, Back UPS

[TradeUPS Program](#)

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"**Distributed** generation, also **distributed** energy, on-site generation (OSG) or district/decentralized energy is generated or stored by a variety of small, grid-connected devices referred to as **distributed** energy resources (DER) or **distributed** energy resource systems."

[Distributed generation - Wikipedia](#)

<https://en.wikipedia.org/wiki/Distribut...>

About this result
 Feedback

People also ask

What is meant by distributed generation?

*Ref 1/2*

xA



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**Distributed generation**, also **distributed energy**, **on-site generation (OSG)**<sup>[1]</sup> or **district/decentralized energy** is **generated** or **stored** by a variety of small, **grid-connected** devices referred to as **distributed energy resources (DER)** or **distributed energy resource systems**.<sup>[2]</sup>

Conventional **power stations**, such as **coal-fired**, **gas** and **nuclear powered** plants, as well as **hydroelectric** dams and large-scale **solar power stations**, are centralized and often require **electricity** to be **transmitted** over long distances. By contrast, DER systems are decentralized, modular and more flexible technologies, that are located close to the load they serve, albeit having capacities of only 10 **megawatts (MW)** or less. These systems can comprise multiple generation and storage components. In this instance they are referred to as **Hybrid power systems**.

DER systems typically use **renewable energy** sources, including **small hydro**, **biomass**, **biogas**, **solar power**, **wind power**, and **geothermal power**, and increasingly play an important role for the **electric power distribution** system. A grid-connected device for **electricity storage** can also be classified as a DER system, and is often called a **distributed energy storage system (DESS)**. By means of an interface, DER systems can be managed and coordinated within a **smart grid**. Distributed generation and storage enables collection of energy from many sources and may lower environmental impacts and improve security of supply.

**Microgrids** are modern, localized, small-scale grids, contrary to the traditional, centralized **electricity grid** (macrogrid). Microgrids can disconnect from the centralized grid and operate autonomously, strengthen grid resilience and help mitigate grid disturbances. They are typically low-voltage AC grids, often use **diesel generators**, and are installed by the community they serve. Microgrids increasingly employ a mixture of different distributed energy resources, such as **solar hybrid power systems**, which reduce the amount of emitted carbon significantly.

RF  
RF  
RF

Bill in Richmond B.C.

2 months

933 KwHs

~~124.97~~

104.19 Cdn 11.2¢ KwH.

Kihei Maui  
1 month

1637 KwHs US\$ 461.91 US\$ 28.22¢ KwH

Cdn 577.39 Cdn. 35.27¢ KwH.

Perth Australia  
2 months

993 KwHs Au\$ 313.55 Au\$ 31.6¢ KwH

Cdn 313.55 Cdn\$ 31.6¢ KwH.

Conclusion After review of the above it is

Prima Facie that electrical rates are substantially higher in jurisdictions that are early adopters of the Distributed energy concept

It is therefore incumbent on the proponents of distributed energy to provide sufficient evidence to prove beyond a balance of probabilities that it is in our best interests at the time

Schedule 1  
2 of 2017



Prepared For

[Redacted]  
RICHMOND BC [Redacted]

Billing Date

Jun 26, 2017

Account Number

[Redacted]

Pay By

Jul 18, 2017

Please Pay

\$104.19

Invoice Number:

[Redacted]

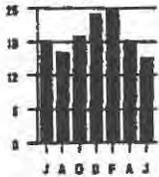
**Meter Reading Information**

Electric:

Apr 26 56321  
Jun 22 57254  
58 days 933

Next meter reading on or about Aug 22

kWh Daily Average Usage per Billing Period



Daily Average Comparison  
Jun 2016 19 kWh  
Jun 2017 16 kWh

Take action to save electricity and money. Visit our website at [bchydro.com/energysavings](http://bchydro.com/energysavings).

Other questions? Call the numbers displayed in the Customer Service area at the top of this bill.

**Previous Bill**

BC Hydro

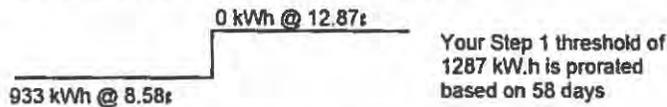
Balance payable from your previous bill 124.68  
Thank you for your payment May 05, 2017 124.68CR

Balance from your previous bill \$0.00

**Electric Charges**

Apr 26 to Jun 22 ( Residential Conservation Rate 1101 )  
Basic Charge: 58 days @ \$0.18990 /day 11.01\*  
Energy charge:<sup>1</sup>  
Step 1: 933 kWh @ \$0.08580 /kWh.h 80.05\*  
Step 2: 0 kWh @ \$0.12870 /kWh.h 0.00  
Rate Rider at 5.0% 4.55\*  
Regional transit levy: 58 days @ \$0.06240 /day 3.62\*  
\* GST 4.96  
**\$104.19**

Your total consumption for the billing period is 933 kWh and your Conservation Rate breakdown is as follows:



<sup>1</sup>For more information on the Conservation Rate visit [bchydro.com/conservationrate](http://bchydro.com/conservationrate).

**Taxes**

The following is a summary of taxes billed to your account since your last invoice:  
GST at 5 % on 99.23 4.96

**Balance payable \$104.19**

**Customer Service**

Phone: (604) 224-9376 Power Out? 1-888-769-3766 or \*49376  
Hours: Mon-Fri 7 a.m. to 8 p.m. and Sat 9 a.m. to 5 p.m. Pacific Time

Account Number:

Service Address Page 1 of 2

KIHEI RD

Invoice Number:

Contract:

02143

Schedule 1

3/10/17

ACCOUNT SUMMARY

(See Bill Detail section for more information)

Service Period	04/27/17	-	05/25/17
Previous Balance	\$386.35		
Payments	\$386.35-		
<b>OUTSTANDING BALANCE</b>			<b>\$0.00</b>
Current Charges	\$296.98		
Current Charges			<b>\$296.98</b>
<b>TOTAL AMOUNT DUE 06/14/2017</b>			<b>\$296.98</b>

MESSAGES

Get prepared! Hurricane season is June through November. Visit [www.mauielectric.com/stormcenter](http://www.mauielectric.com/stormcenter) to download our Handbook for Emergency Preparedness, safety checklist, and more.

BILL PERIOD

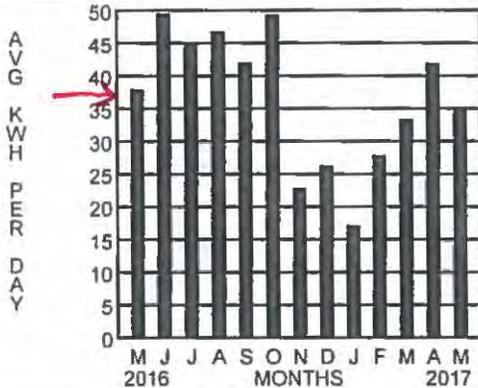
R Residential Service

FROM 04/27/17 TO 05/25/17 29 DAYS

METER#	REGISTER	CURRENT READING	PREVIOUS READING	DIFFERENCE	MULTIPLIER	USAGE
	KWH	70,124.00	69,102.00	1,022.00	1	1,022.00

USAGE PROFILE

ELECTRIC USAGE PROFILE FOR METER MMX000030673



DATE	KWH	AMOUNT	DAYS	KWH/DAY	S/DAY
05/25/17	1022	\$296.98	29	35.24	10.24
04/26/17	1259	\$386.35	30	41.97	12.88
03/27/17	1001	\$294.14	30	33.37	9.80
02/25/17	836	\$239.74	30	27.87	7.99
01/26/17	498	\$145.27	29	17.17	5.01
12/28/16	790	\$218.88	30	26.33	7.30
11/28/16	730	\$199.00	32	22.81	6.22
10/27/16	1480	\$424.91	30	49.33	14.16
09/27/16	1346	\$391.35	32	42.06	12.23
08/26/16	1405	\$418.70	30	46.83	13.96
07/27/16	1350	\$396.57	30	45.00	13.22
06/27/16	1637	\$461.91	33	49.61	14.00
05/25/16	1101	\$292.65	29	37.97	10.09

13,354 3873.80 29.0¢  
 +305  
 366 kWh 5152.15  
 1 day cdn 386¢ cdn  
 296.98  
 298.97

non # 1933914

ENTERED 5/31/17

WHEN PAYING IN PERSON, PLEASE PRESENT BOTH PORTIONS  
PLEASE DETACH AND RETURN THIS PORTION WITH YOUR PAYMENT

Mau Electric Company  
PO Box 398  
Kahului, HI 96733-6898  
Telephone: (808) 871-9777

ACCOUNT NUMBER

TOTAL AMOUNT DUE  
\$296.98

AMOUNT ENCLOSED

DUE DATE  
Jun 14, 2017

E-Bill

PLEASE MAKE CHECKS  
PAYABLE TO:

Mau Electric Company  
PO Box 1670  
Honolulu, HI 96806-1670



KIHEI, HI

21 202011483627 00000029698 00000029698

Maui Electric Company  
PO Box 398  
Kahului, HI 96733-6898

Account Number:

Invoice Number:

Service Address

KIHEI RD

Contract:

*Schedule 1*  
*4 of 10*  
*7*

**BILL DETAIL**

DESCRIPTION	AMOUNT	TOTALS
PREVIOUS BALANCE	\$386.35	
Incoming Payment on 05/15/2017 - Thank You	\$386.35-	
	Outstanding Balance	\$0.00
<b>CURRENT CHARGES</b>		
Electric Service R Residential Service		
Customer Charge	\$8.50	
Base Fuel Energy	\$235.08	
Non Fuel Energy	\$110.64	
Energy Cost Adjustment	\$78.60-	
PBF Surcharge	\$5.99	
Purchased Power Adjustment	\$0.20-	
IRP Cost Recovery	\$0.19-	
RBA Rate Adjustment	\$14.39	
Renewable Infrastructure Pgm	\$0.10	
Green Infrastructure Fee	\$1.27	
	<b>Total for Current Charges</b>	<b>\$296.98</b>
<b>Total Amount Due</b>		<b>\$296.98</b>

**Contact Information**

**Customer Service**

Maui (8 00 AM to 5 00 PM) 871-9777  
Lanai (8 00 AM to 5 00 PM) 1-877-871-8461  
Molokai (8 00 AM to 5 00 PM) 1-877-871-8461

**Emergencies/Power Interruptions Only**

Maui (24 hours) 871-7777  
Lanai and Molokai (24 hours) 1-877-871-8461

**Payment Options:**

By Mail, P.O. Box 1670, Honolulu, HI 96806-1670

Go online to [www.mauielectric.com](http://www.mauielectric.com)

By Charge, Checking/Savings Debit Card, or Electronic Check.\*  
Residential & Commercial Customers 1-888-813-2207

\* Payment fees will apply. Please allow a minimum of 3 business days for your account to be credited.

**In Person**

210 West Kamehameha Avenue, Kahului (8 00 AM to 5 00 PM)  
Our office is closed on weekends and holidays.

**First Hawaiian Bank\*\***

Payment must be made on the island where services are rendered. Payment fee will apply.

Western Union Agents.\*\* Foodland, Sack N Save, Times Supermarkets, Safeway

Molokai Community FCU (Members only)\*\*

\*\* Remittance stub is required. Please allow a minimum of 2 business days for your account to be credited. Other restrictions may apply.

**When a Bill Is Estimated**

We try to read your meter each month, but if for some reason we cannot, your bill will be based on an estimate of recent average use. You are responsible for ensuring that your meter is unobstructed and accessible.

**Important Information**

**Moving or Starting New Service**

Please call us at least 2 business days before moving or starting new service.

**Late Payment**

A late payment charge of 1% (for electric service accounts) and 0.83% (for non-electric service accounts) shall be applied to any unpaid balance (excluding unpaid late payment charges) no earlier than 31 days since the generation of the last bill.

Your service may be disconnected if payment is received after the stated due date. If your service is disconnected, you may be required to pay your bills in full before your service is restored, and to pay a service establishment charge and a cash deposit.

**Life Support or Emergency Equipment**

Please contact our Customer Service if anyone living in your home is dependent on life support or emergency equipment. However, because unplanned outages can and do occur, it is important for customers on life support to make alternative plans should the power go out at their homes.

For other information regarding your service, account charges, and rate schedules, please visit our website at [www.mauielectric.com](http://www.mauielectric.com) or call Customer Service.

E - B i l l



Schedule 1  
50 of 7

### Your account details

Account number	[REDACTED]
Invoice number	[REDACTED]
Date of issue	25 Jul 2017
Account period	25 May 2017 - 25 Jul 2017 (62 days)

### Your account summary

	Opening balance	\$0.00
		+
	New charges	\$313.55
Due		=
10 Aug 2017	Total	\$313.55

WANNEROO WA [REDACTED]

## Electricity Account

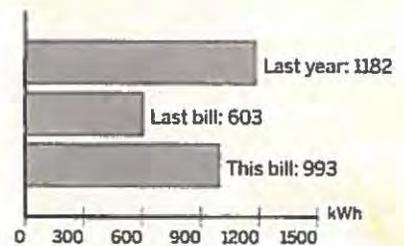
## Tax Invoice

Need help with your bill? Visit [synergy.net.au/help](http://synergy.net.au/help)

There will be no changes to your REBS buyback rate in 2017/2018, after the State Government announced price changes to residential retail tariffs from 1 July 2017.

You can find out more at [synergy.net.au/pricechanges](http://synergy.net.au/pricechanges)

### How much energy have you used?



Your average daily usage 16.8305 units  
 Your average daily cost \$5.29 per day



To see how your usage compares with your suburb, similar sized homes, or to access popular energy saving tips, visit [synergy.net.au/myaccount](http://synergy.net.au/myaccount)

# How we've calculated your bill

*Schedule*  
6 7 8 9

## Previous bill and payments

Last bill	\$147.35
Payments and adjustments	\$147.35cr
Opening balance	\$0.00

## Your energy supply details

[Redacted] Wanneroo WA [Redacted]

Next scheduled read date: 18 Sep 2017

## Your usage summary for meter number: 0350027929

Supply period: 24 May 2017 - 21 Jul 2017	Previous meter reading	Current meter reading	Units imported (kWh)	Units exported (kWh)
On-peak	8651	8955	304.0000	
On-peak	2891	2896		5.0000
Off-peak	14959	15307	348.0000	
High shoulder	6338	6480	142.0000	
High shoulder	1777	1793		16.0000
Low shoulder	6165	6364	199.0000	
Low shoulder	1818	1825		7.0000

## Your usage summary for meter number: [Redacted]

Supply period: 01 Jul 2017 - 21 Jul 2017	Previous meter reading	Current meter reading	Units imported (kWh)	Units exported (kWh)
Off-peak	0	0		0.0000

## New charges

SmartPower (SM1) tariff Charge period: 24 May 2017 - 30 Jun 2017	Units	Unit of measure	Unit price (cents)	Amount
On-peak	195.0000	kWh	47.5004	\$92.63
Off-peak	224.0000	kWh	12.3429	\$27.65
High shoulder	91.0000	kWh	23.7138	\$21.58
Low shoulder	128.0000	kWh	19.6512	\$25.15
Supply charge	38	days	44.1808	\$16.79

## Important information

**Need more time to pay?**  
If you're on holidays or just a little short this month, we can help. Visit [synergy.net.au/extension](http://synergy.net.au/extension)

**Moving home?**  
Start, close or transfer your connection online. Visit [synergy.net.au/moving](http://synergy.net.au/moving)

**Concessions**  
Concession card holders may be eligible to receive a rebate on their residential electricity bill. For more information, visit [synergy.net.au/concessions](http://synergy.net.au/concessions)

**If your account has been estimated**  
If you wish to find out how or why it was estimated, or if you would like to request a meter reading, call us on 13 13 53.

**Customer Charter**  
For information on our products and services, and our obligations under the Customer Service Code, visit [synergy.net.au/charter](http://synergy.net.au/charter)

**Complaints**  
If you have a complaint, please call 1800 208 987. If you're not satisfied with the resolution, you may contact the Energy and Water Ombudsman on 1800 754 004.

**Faults**  
Call the Western Power 24hr emergency line on 13 13 51.

## We're here to help

- [synergy.net.au](http://synergy.net.au)
- 13 13 53
- TTY Service: (08) 9221 8608
- Interpreter Service: 13 14 50

PM51 INV mail\_registr\_005 033072 006072



**SmartPower (SM1) tariff**  
**Charge period: 01 Jul 2017 - 21 Jul 2017**

	Units	Unit of measure	Unit price (cents)	Amount
On-peak	109.0000	kWh	48.5236	\$52.89
Off-peak	124.0000	kWh	12.6088	\$15.63
High shoulder	51.0000	kWh	24.2246	\$12.35
Low shoulder	71.0000	kWh	20.0745	\$14.25
Supply charge	21	days	86.2780	\$18.12

**SmartPower (SM1) tariff**  
**Charge period: 24 May 2017 - 21 Jul 2017**

	Units	Unit of measure	Unit price (cents)	Amount
*On-peak Renewable Energy Buyback Scheme	5.0000	kWh	7.1350	\$0.35cr
*High shoulder Renewable Energy Buyback Scheme	16.0000	kWh	7.1350	\$1.14cr
*Low shoulder Renewable Energy Buyback Scheme	7.0000	kWh	7.1350	\$0.50cr
*Net Feed-in tariff	28.0000	kWh	40.0000	\$11.20cr

Plus GST @ 10.00%

\$29.70

**Total new charges**

**\$313.55**

\*GST free

If you're having problems paying your account, assistance is available. Please contact us before the due date.

A \$5.00 fee may apply for additional reminder notices sent regarding overdue payment of this account.

*Schedule 1*  
*7 of 100*  
*7*

maui wind farm

x



ALL

MAPS

IMAGES

NEWS

VIDEOS

SHOPPING

BOOKS

FLIGHTS

### Kaheawa Wind Power - Wikipedia

[https://en.wikipedia.org/wiki/Kaheaw...](https://en.wikipedia.org/wiki/Kaheawa...)

Kaheawa Wind Power is one of the largest wind farms in Hawaii. It is located on the island of Maui above the town of Maalaea in the West Maui Mountains. Phase one (KWP I) of the project was ...

**Construction cost:** \$69 million (I); \$67 million (II)

**Annual output:** 192 GWh

**Hub height:** 51.2 m (168 ft)

**Location:** Maui, Hawaii



### Auwahi Wind - Sempra Renewables

[www.semprarenewables.com/project](http://www.semprarenewables.com/project)

Auwahi Wind, located on the wind-rich Ulupalakua Ranch on the southeast coast of Maui, Hawaii, is a joint venture of Sempra Renewables and BP Wind Energy. The 21-megawatt (MW) wind ...



### Wind Energy | Maui Electric

<https://www.mauielectric.com/wind>

Hawaiian Electric pioneered wind energy development in Hawaii in the early 1990s. Today, Hawaiian Electric, Maui Electric, and Hawaii Electric Light

continue to add more wind power to island ...



Images

VIEW ALL

Through August before the accident, Auwahi produced 56,369 megawatt hours with MECO accepting 55,525 MWh, according to MECO filings with the state Public Utilities Commission. Last year, Auwahi produced a total of 91,155 MWh of wind-generated power.

According to the final environmental impact statement for the project, filed in August 2011, each tower weighs 283 tons, based on transport weight. The nacelle, which houses all of the generating components of a wind turbine, is 82.5 tons, alone.

Each tower is 262 feet high with blades running 166 feet, according to the EIS. The turbine manufacturer is Siemens, which has been consulted on the accident, said Sempra.

The wind farm, with a footprint of about 68 acres on Ulupalakua Ranch land, has an estimated 20-year lifespan. The power purchase agreement with MECO, approved by the PUC in June 2011, was for 20 years.

The 21-MW wind farm went online in December 2012.

\* Lee Imada can be reached at [leeimada@mauinews.com](mailto:leeimada@mauinews.com).



# Wind Power Costs Raise Maui Consumers' Electric Bills



Shannon Tangonan said Wednesday.

In March, the proportion of wind energy used to generate electricity on Maui was about 25 percent. In April, it was 41 percent, she said.

'Right now the cost of wind energy is higher than the cost of oil-generated electricity, Tangonan said. 'In months when the proportion of wind energy increases, as it did in April, the Maui bills may increase.'

Maui Electric Co. paid about 13 cents a kilowatt-hour for its oil-powered plants in April. The average price for wind energy on Maui is about 19 cents a kilowatt-hour.

The utility has 20-year contracts with three wind power facilities on Maui — Kaheawa Wind Farm I, Kaheawa Wind Farm II and Auwahi Wind Farm — that they must buy wind energy from

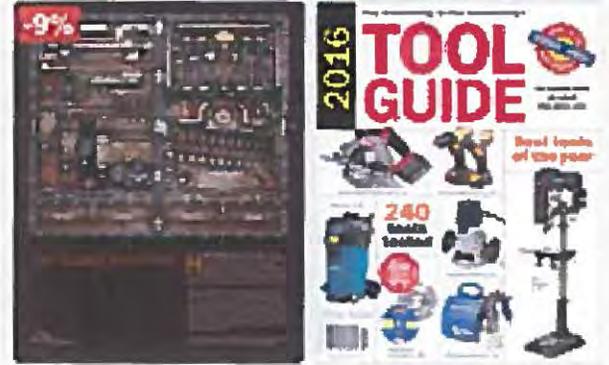
Oahu consumers say they also saw a slight raise in their electric bills.

The Oahu increases are due to higher fuel prices, Tangonan said.

Information from: Honolulu Star-Advertiser, <http://www.staradvertiser.com>

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Tags: Hawaii



7.47

## Best States

- #1 Massachusetts
- #2 New Hampshire
- #3 Minnesota
- #4 North Dakota
- #5 Washington



*Shannon Tangonan*  
375

See Rankings List



JOSEPH P. VIOLA

Vice President

Regulatory Affairs

March 7, 2017

FILED

2017 MAR -7 P 3:49

The Honorable Chairman and Members  
of the Hawai'i Public Utilities Commission  
Kekuanaoa Building, 1st Floor  
465 South King Street  
Honolulu, Hawai'i 96813

PUBLIC UTILITIES  
COMMISSION

Dear Commissioners:

Subject: Docket No. 2007-0008

Renewable Portfolio Standards Law Examination

In accordance with Decision and Order No. 23912 and the Framework for Renewable Portfolio Standards, issued December 20, 2007, attached is the Renewable Portfolio Standard Status Report for the year ended December 31, 2016 for Hawaiian Electric Company, Inc., Hawai'i Electric Light Company, Inc. and Maui Electric Company, Limited.

Sincerely,

Attachment

*Schedule A17  
4-7-17*

Schedule 2  
5 of 5

**2016 Renewable Portfolio Standard Status Report**  
**Hawaiian Electric Company, Inc. ("Hawaiian Electric")**  
**Hawai'i Electric Light Company, Inc. ("Hawai'i Electric Light")**  
**Maui Electric Company, Limited ("Maui Electric")**

**For the Year Ended December 31, 2016**  
*(In Net Megawatt Hours)*

	2016				2015
	Hawaiian Electric	Hawai'i Electric Light	Maui Electric	TOTAL	TOTAL
<b>Electrical Energy Generated Using Renewable Energy Sources</b>					
Biomass (including municipal solid waste) <sup>1</sup>	418,735		4,383	423,118	416,716
Geothermal <sup>1</sup>		260,116		260,116	230,495
Photovoltaic and Solar Thermal <sup>1</sup>	53,723	4,071	9,078	66,872	51,212
Hydro <sup>1</sup>		54,108	968	55,076	73,098
Wind <sup>1</sup>	233,531	145,691	277,456	656,678	612,782
Biofuels	37,491		984	38,475	53,412
Customer-Sited, Grid-Connected <sup>2</sup>	548,562	114,784	119,438	782,785	643,060
<b>TOTAL</b>	<b>1,292,042</b>	<b>578,770</b>	<b>412,308</b>	<b>2,283,120</b>	<b>2,080,775</b>
<b>TOTAL SALES</b>	<b>6,660,195</b>	<b>1,067,398</b>	<b>1,117,742</b>	<b>8,845,336</b>	<b>8,956,498</b>
<b>RPS PERCENTAGE</b>					
(Not Counting Energy Efficiency and Solar Water Heating)	19.4%	54.2%	36.9%	25.8%	23.2%

<sup>1</sup> Renewable electrical energy generated is based on recorded data from FIT contracts and Independent Power Producers with PPAs.

<sup>2</sup> Renewable electrical energy generated by customer-sited, grid-connected technologies is based on known system installations for 2016 including Net Energy Metering ("NEM") installations, non-NEM systems, and Sun Power for Schools installations. Recorded generation data was used when available. For systems where recorded data was not available, estimates were made based on reasonable performance assumptions for typical photovoltaic systems.

*Both Wind farms*

# Schedule 3

1 of 2

## Scaling of Kaheawa Windfarm

Ph I \$69,000,000 US

Ph II \$67,000,000 US

Total \$136,000,000 US

\$170,000,000 Cdn

Annual Output @ 43% efficiency 192 GWh. <sup>annual</sup> <sub>output</sub>

Nameplate 34 - 1.5 MW GE Units 51 MW Wind Farm

5,100 GWh Site C

192 GWh

= 26  $\frac{1}{2}$  times

\$170,000,000 x 26  $\frac{1}{2}$  = \$4,505,000,000

plus 10% contingency #1

450500000

\$4,955,500,000

rounded to \$5,000,000,000

Configured in B.C. as 14 or 15 100 MW windfarms

#1 converted to # Cdn at 125%

#2 contingency required for efficiency variations. Many windfarms run in the 35% to 40% range for a number of reasons

## Scaling the Kahaewa Wind Farm

The Hawaii Public Utilities Commission Approval tariff provides a 20 year ~~or~~ supply contract with a 20 year write off of the equipment as a payment by Maui Electric Company to the Independent Power Producer of \$190.00 MWh or \$238.00 MWh Cdn

Amortizing the scaled cost over 20 years would be

$$\frac{\$5,000,000,000}{20 \text{ years}} = \$100,000,000 \text{ amort per year}$$

Paying off 5,000,000,000 at 3% interest over 20 years would be

$$= 333,365,000 \text{ per year}$$

Cost of Power using the Maui IPP Tariff would be

$$5,100,000 \text{ MWh} \times \$238 = \$1,213,800,000$$

The above is intermittent power not dispatchable power

Schedule 4  
1/1

### Amortization of Costs

- (1) \$8,900,000 over 70 years in Site C DAM \$127,143,000 per year
- (2) \$900,000 over 50 years in Site C DAM \$178,000,000 per year

- (3) \$500,000,000 (Wind Farms) 25 years in \$200,000,000 per year

- (4) \$500,000,000 (Wind Farms) 20 years in \$250,000,000 per year

Sunk cost of Site C abandoned  
 whereas a 20 to 25 years to pay off with no return

- (5) \$2,500,000,000 Sunk cost Wind off 25 years in \$100,000,000 per year

- (6) \$2,500,000,000 Sunk cost Wind off 20 years in \$125,000,000 per year

Note the Wind farms needs to be replaced every 20-25 years  
 The bank costs might be smaller if in 1 year they will be  
 paid off in a 20 to 25 year period of banks

# Debt Amortization Schedule

Millions

Totals  
 \$ 12,421,000,000  
 \$ 304,600,000

per Million Dollars  
 total interest \$ 1,395,670  
 annual payment \$ 34,224

Site C  
 70 years

total interest \$ 933,942  
 annual payment \$ 26,679

x 8,900  
 x 8,900

\$ 8,321,000,000  
 \$ 374,200,000

Site C  
 50 years

total interest \$ 425,016  
 annual payment \$ 57,000

x 5,000  
 x 5,000

\$ 2,125,000,000  
 \$ 285,000,000

Wind Farms  
 25 years

total interest \$ 425,016  
 annual payment \$ 57,000

x 7500  
 x 7500

\$ 1,063,000,000  
 \$ 143,000,000

Sunk Cost Writeoff  
 25 years

total interest \$ 533,457  
 annual payment \$ 66,673  
 total interest \$ 333,457  
 annual payment \$ 66,673

x 5,000  
 x 5,000  
 x 2,500  
 x 2,500

\$ 1,667,000,000  
 \$ 333,000,000  
 \$ 834,000,000  
 \$ 166,683,000

Wind Farms  
 20 years  
 Sunk Cost Writeoff  
 20 years

*Schedule 5*  
*2/5*

**Amortization Schedule**  
**\$1,000,000.00 at 3% interest**  
**with 280 quarterly payments**  
**Total Payments: \$2,395,670.95**  
**Total Interest: \$1,395,670.95**

#	Payment Amount	Principal Amount	Interest Amount	Balance Owed
1	8,555.98	1,055.98	7,500.00	998,944.02
2	8,555.98	1,063.90	7,492.08	997,880.12
3	8,555.98	1,071.88	7,484.10	996,808.24
4	8,555.98	1,079.92	7,476.06	995,728.32
#	Payment	Principal	Interest	Balance
5	8,555.98	1,088.02	7,467.96	994,640.30
6	8,555.98	1,096.18	7,459.80	993,544.12
7	8,555.98	1,104.40	7,451.58	992,439.72
8	8,555.98	1,112.68	7,443.30	991,327.04
#	Payment	Principal	Interest	Balance
9	8,555.98	1,121.03	7,434.95	990,206.01
10	8,555.98	1,129.43	7,426.55	989,076.58
11	8,555.98	1,137.91	7,418.07	987,938.67
12	8,555.98	1,146.44	7,409.54	986,792.23
#	Payment	Principal	Interest	Balance
13	8,555.98	1,155.04	7,400.94	985,637.19
14	8,555.98	1,163.70	7,392.28	984,473.49
15	8,555.98	1,172.43	7,383.55	983,301.06
16	8,555.98	1,181.22	7,374.76	982,119.84
#	Payment	Principal	Interest	Balance
17	8,555.98	1,190.08	7,365.90	980,929.76
18	8,555.98	1,199.01	7,356.97	979,730.75
19	8,555.98	1,208.00	7,347.98	978,522.75
20	8,555.98	1,217.06	7,338.92	977,305.69
#	Payment	Principal	Interest	Balance
21	8,555.98	1,226.19	7,329.79	976,079.50

*Schedule 5  
3 of 5*

**Amortization Schedule  
\$1,000,000.00 at 3% interest  
with 200 quarterly payments  
Total Payments: \$1,933,941.70  
Total Interest: \$933,941.70**

#	Payment Amount	Principal Amount	Interest Amount	Balance Owed
1	9,669.72	2,169.72	7,500.00	997,830.28
2	9,669.72	2,185.99	7,483.73	995,644.29
3	9,669.72	2,202.39	7,467.33	993,441.90
4	9,669.72	2,218.91	7,450.81	991,222.99
#	Payment	Principal	Interest	Balance
5	9,669.72	2,235.55	7,434.17	988,987.44
6	9,669.72	2,252.31	7,417.41	986,735.13
7	9,669.72	2,269.21	7,400.51	984,465.92
8	9,669.72	2,286.23	7,383.49	982,179.69
#	Payment	Principal	Interest	Balance
9	9,669.72	2,303.37	7,366.35	979,876.32
10	9,669.72	2,320.65	7,349.07	977,555.67
11	9,669.72	2,338.05	7,331.67	975,217.62
12	9,669.72	2,355.59	7,314.13	972,862.03
#	Payment	Principal	Interest	Balance
13	9,669.72	2,373.25	7,296.47	970,488.78
14	9,669.72	2,391.05	7,278.67	968,097.73
15	9,669.72	2,408.99	7,260.73	965,688.74
16	9,669.72	2,427.05	7,242.67	963,261.69
#	Payment	Principal	Interest	Balance
17	9,669.72	2,445.26	7,224.46	960,816.43
18	9,669.72	2,463.60	7,206.12	958,352.83
19	9,669.72	2,482.07	7,187.65	955,870.76
20	9,669.72	2,500.69	7,169.03	953,370.07
#	Payment	Principal	Interest	Balance
21	9,669.72	2,519.44	7,150.28	950,850.63

*Schedule 5*  
*4 of 5*

**Amortization Schedule**  
**\$1,000,000.00 at 3% interest**  
**with 100 quarterly payments**  
**Total Payments: \$1,425,016.38**  
**Total Interest: \$425,016.38**

#	Payment Amount	Principal Amount	Interest Amount	Balance Owed
1	14,250.17	6,750.17	7,500.00	993,249.83
2	14,250.17	6,800.80	7,449.37	986,449.03
3	14,250.17	6,851.80	7,398.37	979,597.23
4	14,250.17	6,903.19	7,346.98	972,694.04
#	Payment	Principal	Interest	Balance
5	14,250.17	6,954.96	7,295.21	965,739.08
6	14,250.17	7,007.13	7,243.04	958,731.95
7	14,250.17	7,059.68	7,190.49	951,672.27
8	14,250.17	7,112.63	7,137.54	944,559.64
#	Payment	Principal	Interest	Balance
9	14,250.17	7,165.97	7,084.20	937,393.67
10	14,250.17	7,219.72	7,030.45	930,173.95
11	14,250.17	7,273.87	6,976.30	922,900.08
12	14,250.17	7,328.42	6,921.75	915,571.66
#	Payment	Principal	Interest	Balance
13	14,250.17	7,383.38	6,866.79	908,188.28
14	14,250.17	7,438.76	6,811.41	900,749.52
15	14,250.17	7,494.55	6,755.62	893,254.97
16	14,250.17	7,550.76	6,699.41	885,704.21
#	Payment	Principal	Interest	Balance
17	14,250.17	7,607.39	6,642.78	878,096.82
18	14,250.17	7,664.44	6,585.73	870,432.38
19	14,250.17	7,721.93	6,528.24	862,710.45
20	14,250.17	7,779.84	6,470.33	854,930.61
#	Payment	Principal	Interest	Balance
21	14,250.17	7,838.19	6,411.98	847,092.42

Schedule 5  
5 of 5

**Amortization Schedule**  
**\$1,000,000.00 at 3% interest**  
**with 80 quarterly payments**  
**Total Payments: \$1,333,456.98**  
**Total Interest: \$333,456.98**

#	Payment Amount	Principal Amount	Interest Amount	Balance Owed
1	16,668.21	9,168.21	7,500.00	990,831.79
2	16,668.21	9,236.97	7,431.24	981,594.82
3	16,668.21	9,306.25	7,361.96	972,288.57
4	16,668.21	9,376.05	7,292.16	962,912.52
#	Payment	Principal	Interest	Balance
5	16,668.21	9,446.37	7,221.84	953,466.15
6	16,668.21	9,517.21	7,151.00	943,948.94
7	16,668.21	9,588.59	7,079.62	934,360.35
8	16,668.21	9,660.51	7,007.70	924,699.84
#	Payment	Principal	Interest	Balance
9	16,668.21	9,732.96	6,935.25	914,966.88
10	16,668.21	9,805.96	6,862.25	905,160.92
11	16,668.21	9,879.50	6,788.71	895,281.42
12	16,668.21	9,953.60	6,714.61	885,327.82
#	Payment	Principal	Interest	Balance
13	16,668.21	10,028.25	6,639.96	875,299.57
14	16,668.21	10,103.46	6,564.75	865,196.11
15	16,668.21	10,179.24	6,488.97	855,016.87
16	16,668.21	10,255.58	6,412.63	844,761.29
#	Payment	Principal	Interest	Balance
17	16,668.21	10,332.50	6,335.71	834,428.79
18	16,668.21	10,409.99	6,258.22	824,018.80
19	16,668.21	10,488.07	6,180.14	813,530.73
20	16,668.21	10,566.73	6,101.48	802,964.00