

# Energy Efficiency as a way of Improving Competitiveness in the Agricultural Sector

**ZERA**

**18 August 2015**

**FARMERS INDABA – CROWNE PLAZA**

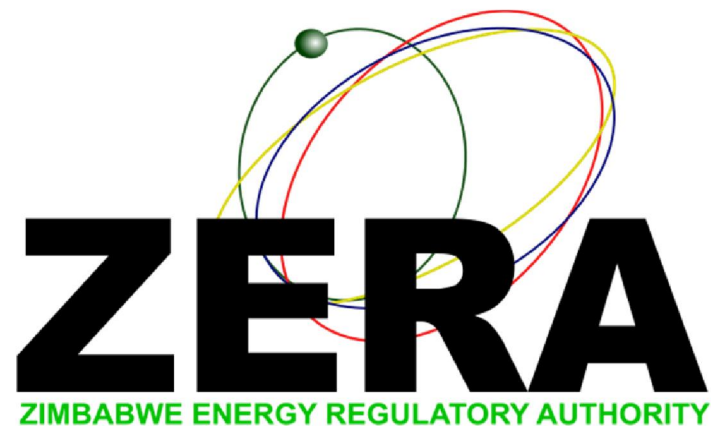


# Presentation Outline

- 1) ZERA Functions
- 2) Why energy efficiency?
- 3) Energy Usage - Agriculture
- 4) ZERA EE Initiatives
- 5) Good Opportunities to Improve Farm Energy Efficiency
- 6) Conclusion



# ZERA OVERVIEW



# General Functions of ZERA

Key ZERA functions are oriented towards protection of Consumers, Investors and the Environment summarised as follows:

- Regulation and licensing
- Research and development
- To increase access and security of supply
- Energy efficiency and environmental protection
- Key stakeholder advisory (to advise and educate consumers and licensees regarding the efficient use of energy – Energy Regulatory Act 13:23)



# Why & What is Energy Efficiency?

- Currently , Zimbabwe has a supply deficit of up to +/- 600MW –due to insufficient internal generation capacity and limited sources of imports.
- Energy efficiency refers to products or systems using less energy to do the same or better job than conventional products or systems.
- Using less energy to provide the same service increasing production per unit of energy used



# Zim-Asset Target

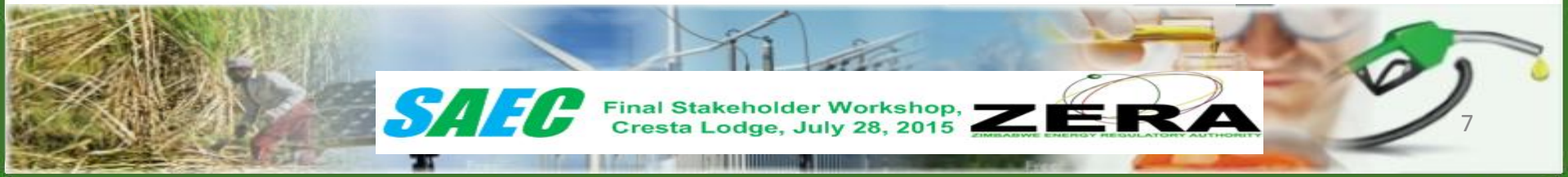
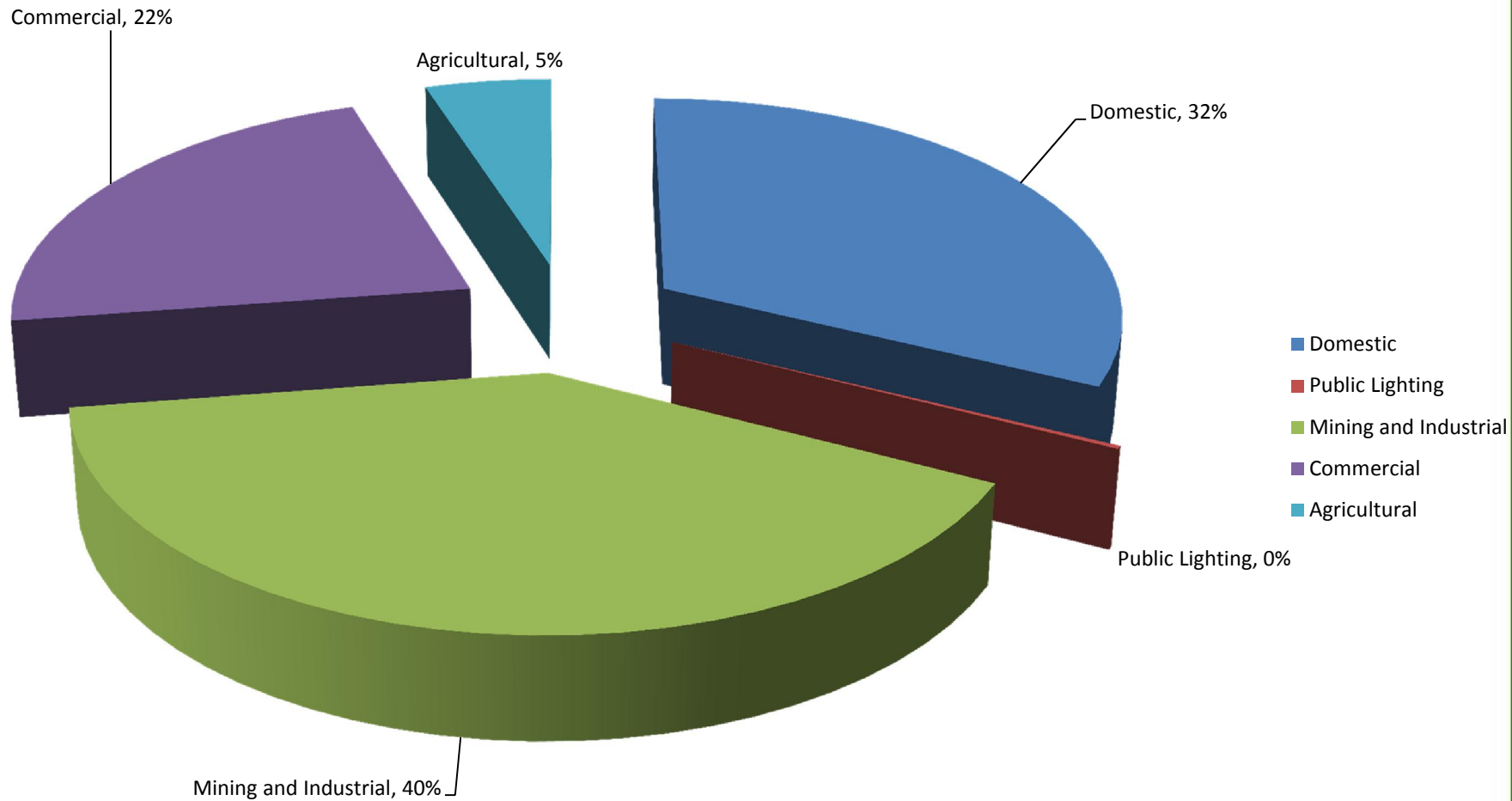


300MW savings  
by  
2018

*How???*



# Energy Consumption – By Category

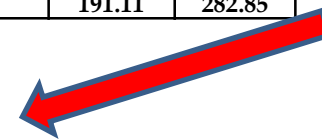


# Potential Energy Savings - Audit

Sector	Saving %	Electricity (GWh/y)
Agriculture	12	58.75
Building	(included in commercial sector )	
Commercial	16.0	247.62
Domestic	22.08	619.47
Manufacturing	18.63	380.07
Mining	7	87.05
*Transport	-	-
<i>Total electricity savings</i>		<b>1392.96</b>

Sector	% Saving	Coal	LPG	Petrol	Kerosene	Diesel	Bio	Electricity	Total
AGRIC	48%	2,739.68	-	-	-	-	1,766.45	303.78	4,809.91
COMMSERV	23%	621.04	-	13.56	2.71	157.30	-	322.73	1,117.34
INDUSTRY	54%	2,739.11	18.72	49.92	18.72	355.65	711.29	1,653.45	5,546.85
TRANS	39%	72.57	-	1,628.32	-	1,161.14	-	-	2,862.03
Households	37%							1,028.44	1,028.44
<b>Total Savings GWH</b>		<b>6,172.41</b>	<b>18.72</b>	<b>1,691.79</b>	<b>21.43</b>	<b>1,674.08</b>	<b>2,477.74</b>	<b>3,308.40</b>	<b>15,364.57</b>
Equivalent MW Savings based on 8760 hours a year		704.61	2.14	193.13	2.45	191.11	282.85	<b>377.67</b>	1,753.95

**377.67MW**





# ZERA EE Initiatives

Energy	
Manufacturer	
Model	
<b>More efficient</b>	
A	
B	
C	
D	
E	
F	
G	
<b>Less efficient</b>	



# ZERA EE Initiatives

1. National Energy Efficiency Audit – at conclusion stage – 377MW of potential savings identified.
2. ZERA is developing EE legislation to include energy efficiency regulations to cater for mandatory energy audits, reporting of energy data and energy efficiency, licensing of energy auditors , firms and the progressive banning of incandescent lamps
3. ZERA is set to introduce tariffs with signals for energy efficiency- this move will compel consumers to use electricity efficiently
4. Promotion of EE in the homes through energy experiments in partnership with SIRDC. These include- electric stoves, electric buckets, geyser timer switch, ethanol stoves tests etc.



# ZERA EE Initiatives Cont'd

5. ZERA has always been spearheading information and education awareness on EE through the media and at all exhibition platforms.
6. ZERA is also promoting EE through R&D from institutions of higher education such as UZ, NUST, HIT, CUT and SIRDC
7. ZERA has funded a Geyser Timer Switch installation project in Gweru with ZETDC implementing the same – meant to reduce electricity demand during peak periods for ZETDC and kWh usage for customers.



# Good Opportunities to Improve Farm EE

As a farmer, you want to save money while you maintain the quality of your produce — milk, meat, or crops. Energy efficient farming can help you do both. Below are some practical energy saving tips that could make a big difference to your energy use.



# Good Opportunities to Improve Farm EE

- ZETDC Time of Use tariff
- Water heating
- Refrigeration
- Lighting
- Mechanical Equipment
- Fuel Usage
- Farm Buildings
- Irrigation



# Good Opportunities to Improve Farm EE

## ZETDC Time-Of-Use Tariff

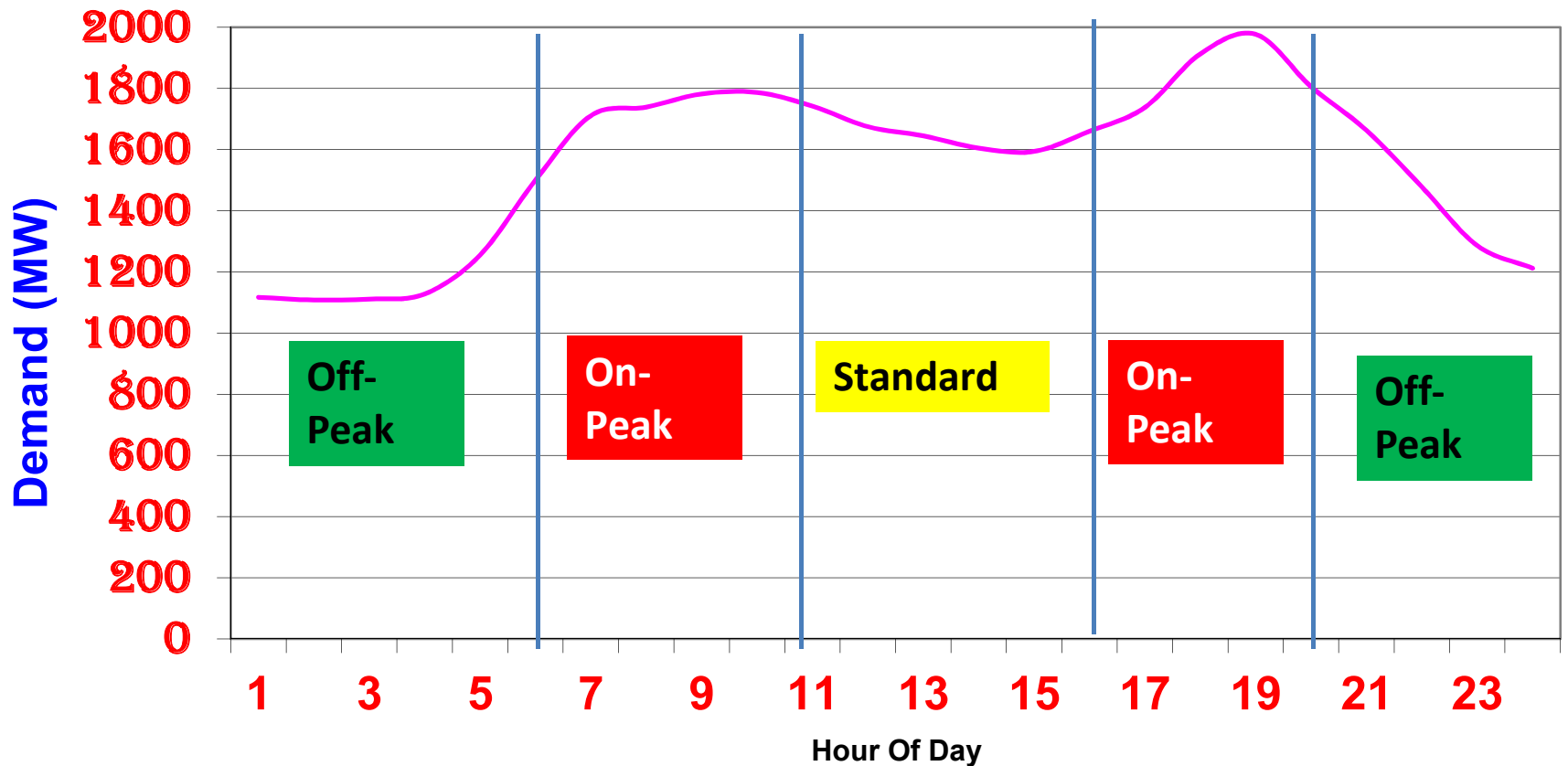
For farmers Metered at 11kV and 33kV

- The tariff offers time –of-use pricing of electricity
- This implies peak, standard and off-peak usage periods with varying energy tariffs .
- Make good use of the off-peak period as it offers the cheapest rate at 4 cents/kWh.
- Shifting of daytime activities to night to take advantage of the tariff.



# Good Opportunities to Improve Farm EE

## Zimbabwe Typical Daily Load Curve - Weekday



# Good Opportunities to Improve Farm EE

## Typical ZETDC Tariff Agricultural Structure

### Agricultural Customers

Low Voltage E5.1	11kV Supply E5.2.11	33kV Supply E5.2.33
\$0.00	\$0.00	\$0.00
n/a	\$5.54	\$4.07
n/a	n/a	n/a
\$0.12	\$0.13	\$0.13
\$0.12	\$0.07	\$0.07
\$0.12	\$0.04	\$0.04





# Good Opportunities to Improve Farm EE

## Water heating

### No cost options

- Maintain your water heating systems – inspect them regularly, repair leaks and fix dripping taps.
- Set thermostats to the right temperature about 55C – overheating water is costly.

### Low cost options

- Insulate hot water pipes. If your hot water cylinder is warm to touch, install insulation wrap.
- Install geyser timer switches to heat water only when required or, if your plan allows, to take advantage of the off-peak ZETDC tariff and avoid losses.

### Options to invest in

- Choose the right sized hot water cylinder for the job. Place hot water cylinders in a sheltered place on the sunny side of the shed.
- Install a heat exchange system which chills milk while generating hot water.

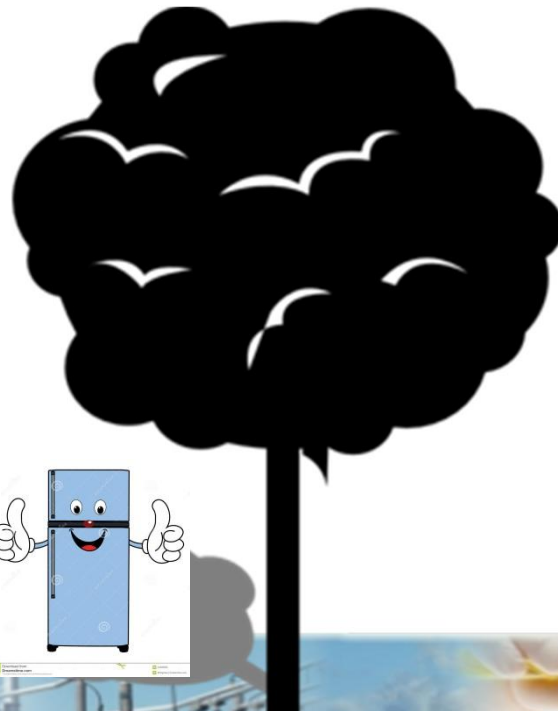


# Good Opportunities to Improve Farm EE

## Refrigeration

### No cost options

- Keep refrigeration systems well maintained – clean and repair fins, fix any leaks and worn seals, and keep condenser coils clean.
- Insulate your vat and pipes, especially if they're outside.
- Keep your refrigeration system well ventilated and located in a shady place.



# Good Opportunities to Improve Farm EE

## Mechanical Equipment

### No cost options

- Reduce motor idle time by identifying motors that are running but not in production.
- If your plan allows, run effluent pumps at night to take advantage of off-peak tariff rates.

### Options to invest in

- Regularly maintain your mechanical equipment — ensure belts and chains are tensioned correctly, and keep filters clean.
- Investigate changing the drive type and gear ratios to reduce energy use.
- Install control systems and variable speed drives to increase efficiency.
- Replace oversized (inherited) inefficient pumps
- Install power factor correction to improve power factor to  $>0.9$



# Good Opportunities to Improve Farm EE

## Lighting

### No cost options

- Turn off lights when not in use
- Regularly clean lights – dirt and dust can reduce light output by 30%.
- Use timers or photocell controls for outdoor lighting

### Options to invest in

- Take advantage of natural light – use clear sheets of corrugated perspex for roofing.
- Replace your old incandescent lights with more efficient LED bulbs/tubes or compact fluorescent bulbs for immediate savings.
- Replace HPS (High pressure sodium) security lights with LED security lights.
- Install motion and daylight sensors for outside lights and in low-use areas.

***For example, replacing a hundred 100 watt incandescent light bulbs with 9 watt LED bulbs will save about \$2,600/year assuming an 8 hour use /day at 10cents/kWh.***



# Use LED lighting and not filament bulbs



**Please Note: A free filament light bulb will cost more than a CFL or LED due to operating costs.**



# Use LED Security Lighting



# Use LED Tubes in place of Fluorescent






**Move to the more efficient LED or at least the T5 fluorescent tube.**



# SOME FACTS ON LIGHTING



			
<b>Light bulb projected lifespan</b>	1,200 hrs	10,000 hrs	50,000 hrs
<b>Watts (equivalent to 60W incandescent bulb)</b>	60	14	5
<b>kWh/year (assuming 8 hours use per day)</b>	175.2	40.88	14.6
<b>Electricity costs per year (assuming a tariff of \$0.10/kWh )</b>	<b>\$17.52</b>	<b>\$4.09</b>	<b>\$1.46</b>
<b>Frequent On/Off Cycling</b>	shortens lifespan	shortens lifespan	no effect
<b>Average unit cost</b>	<b>\$0.50</b>	<b>\$2.00</b>	<b>\$4.00</b>
<b>Hazardous Materials</b>	None	Mercury	None





# Good Opportunities to Improve Farm EE

## Farm Buildings

### No cost options

- Clean your greenhouse glass/plastic to make the most of natural solar heating.
- In livestock barns, take advantage of natural ventilation.
- Keep ventilation fans clean to increase efficiency.

### Options to invest in

- Increase the effectiveness of your greenhouse by fixing broken panes and checking seals around doors, pipes and ventilators.



# Good Opportunities to Improve Farm EE

## Irrigation

### No cost options

- Avoid irrigating on hot sunny or windy days
- Apply only the amount of irrigation water required for crop growth.



## CONCLUSION

*Start implementing  
Energy Efficiency on  
your farm now!*



# **REMEMBER**

**Energy conserved is energy produced**

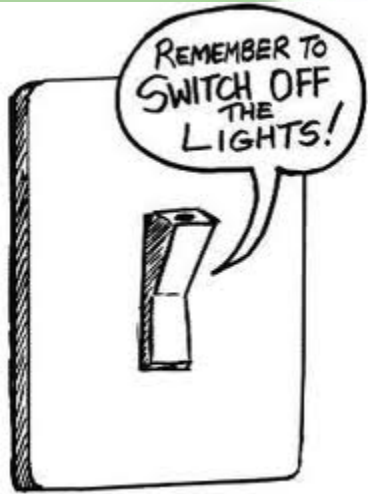
**Save energy today & use it tomorrow**

**Electricity is limited, do not use it unlimitedly**

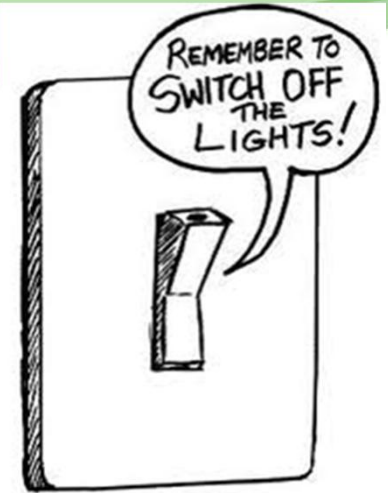
**It is cheaper to save electricity than to generate it**

**MAKE YOUR FUTURE BRIGHT.**





# Thank You



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