



What does energy productivity mean for mining?

What does your energy \$ buy?

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“The popular tagline of
the mining sector is that
the miners are serious
about productivity”

PwC Mining
Productivity, 2015

Overview



Is energy productivity just a rebranding of energy efficiency?

Measuring energy productivity

- Companies
- Commodities

A view of what your energy \$ buys

- Different points of intervention: contract vs reduction

What does this mean for policy?

Energy efficiency vs energy productivity



Energy efficiency

- kWh per production amount
 - kWh per tonne total material moved
 - kWh per ROM tonne

Energy intensity

- kWh per tonne product

Energy productivity

- kWh per \$ product
- \$kWh per \$ product

Energy efficiency vs energy productivity

Energy efficiency

- kWh per product
- kWh per tonne of product
- kWh per unit of product

Energy intensity

- kWh per tonne of product

Does it really matter?

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Corporate energy
productivity information

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Corporate energy productivity



Energy information

- Sustainability reports/GRI G3 and G4
 - Totals available, breakdown for regions not consistent
- CDP focus on emissions
 - Energy totals for regions not broken down by source

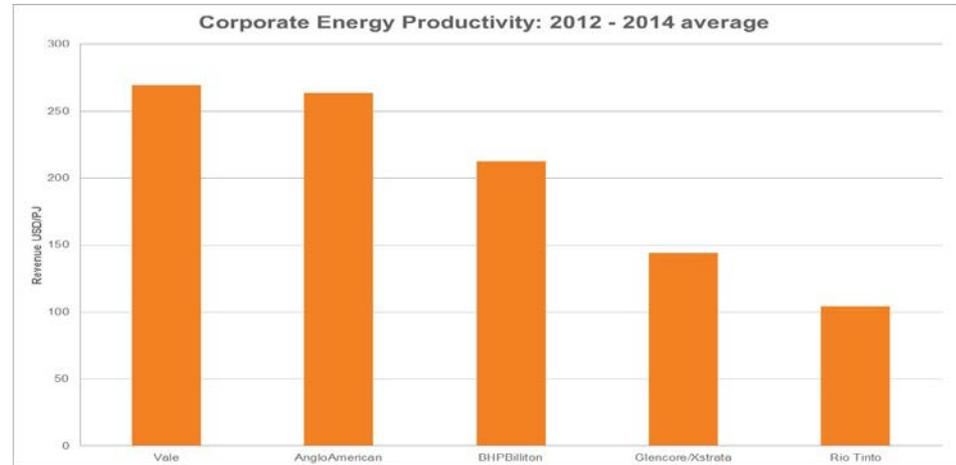
Financial information

- Consistent and comprehensive
- Rules are well established

Corporate energy productivity



Company	2012	2013	2014	EBITDA as % of revenue
	Revenue per energy consumed (USDm/PJ)			
Vale	257	304	247	Not reported
AngloAmerican	-	277	251	28
BHPBilliton	239	203	196	48
Glencore/Xstrata	-	147	140	36
Rio Tinto	101	106	106	40





Commodity energy
productivity information

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Commodity energy productivity



Where did I look

- Sustainability reports
- CDP reports
- Production reports
- Annual reports

Commodity energy productivity



Where did I look

- Sustainability reports
- CDP reports
- Production reports
- Annual reports

EEO reports

Commodity energy productivity



Commodity group	Sales value per energy consumed (USDm/PJ)
Iron ore	1100 – 1800
Gold	250 – 500
Coal <i>thermal and coking</i>	180 – 300
Base metals <i>Ni, Cu, Zn, Pb, Mn</i>	100 – 240
Alumina	0.1 – 0.3



Site energy (electricity)
productivity considerations

What does your electricity \$ buy?



Retail charges

- Consumption (kWh)
- Peak and off peak

Network

- Fixed (day)
- Capacity (kVA and rolling kVA)
- Demand (kWh)

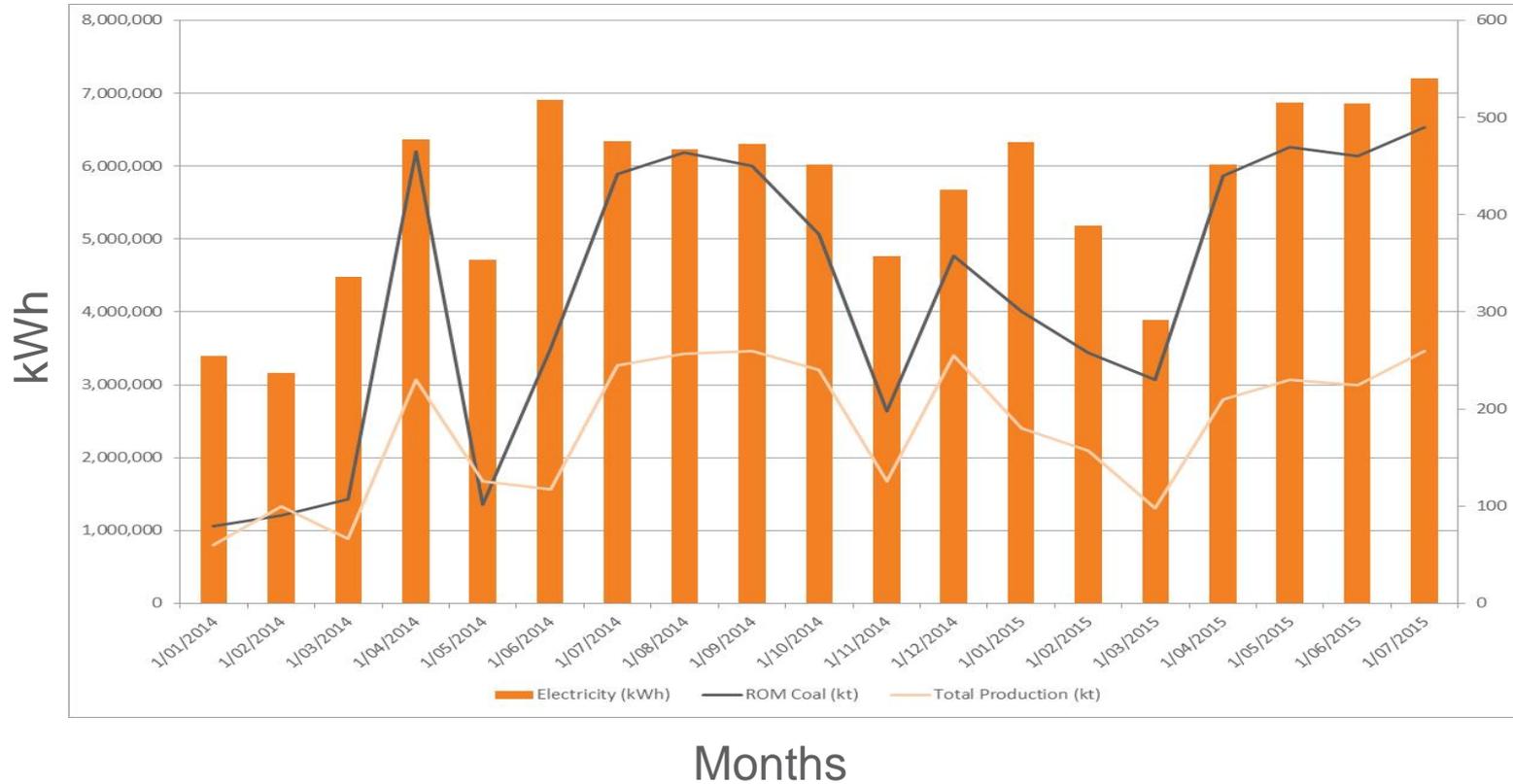
Environmental

- LRET (kWh)
- SRES (kWh)

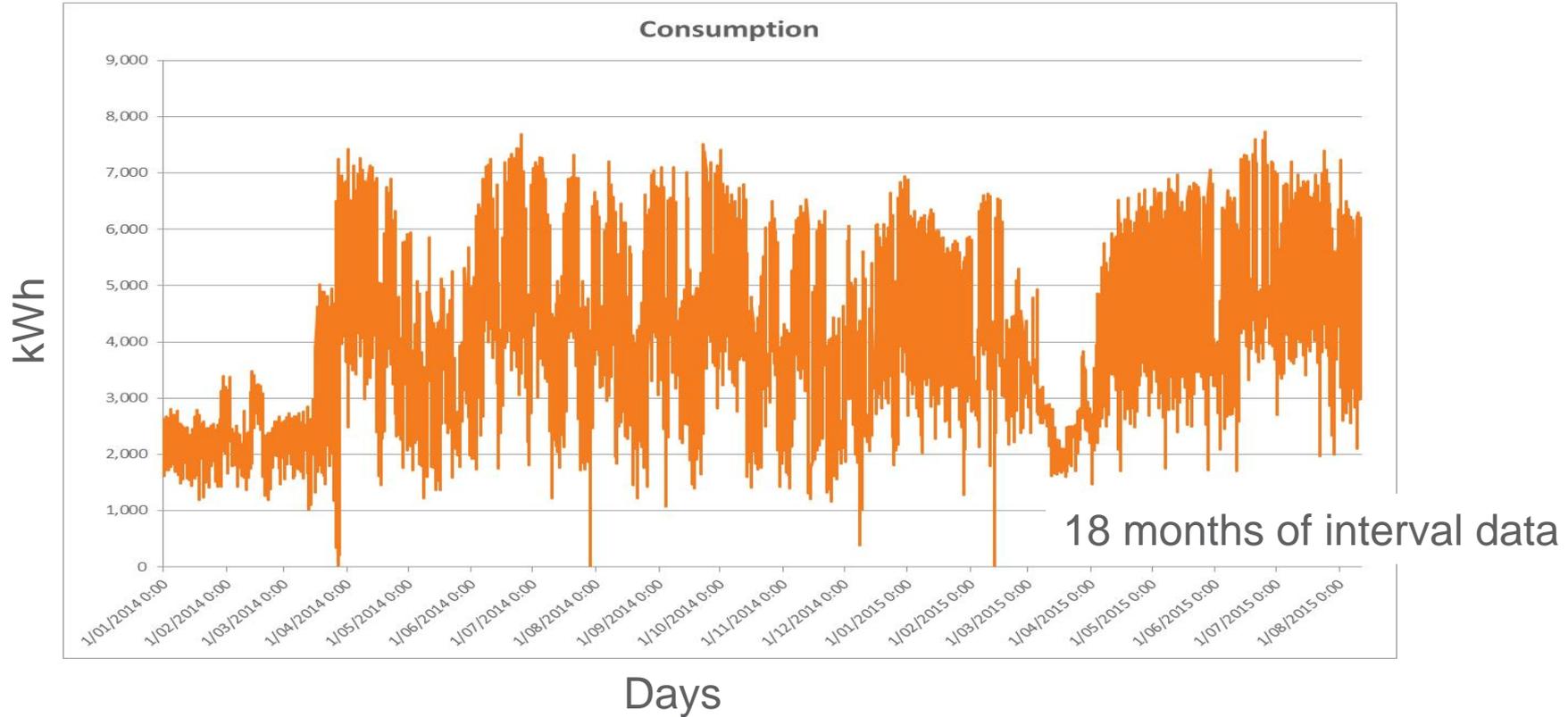
Other contestable

- Market (kWh)
- Metering (day)
- etc

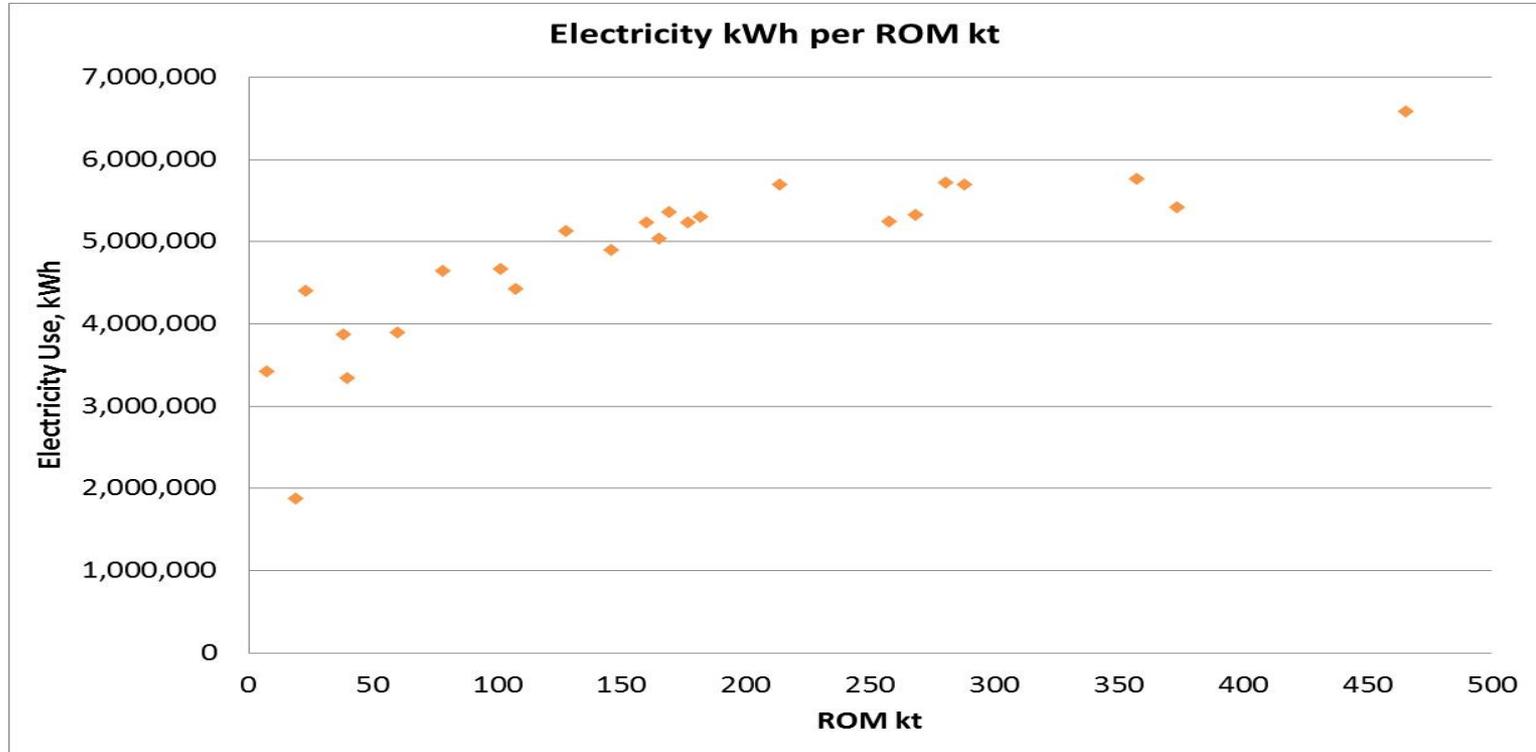
Applying this to an open cut coal mine



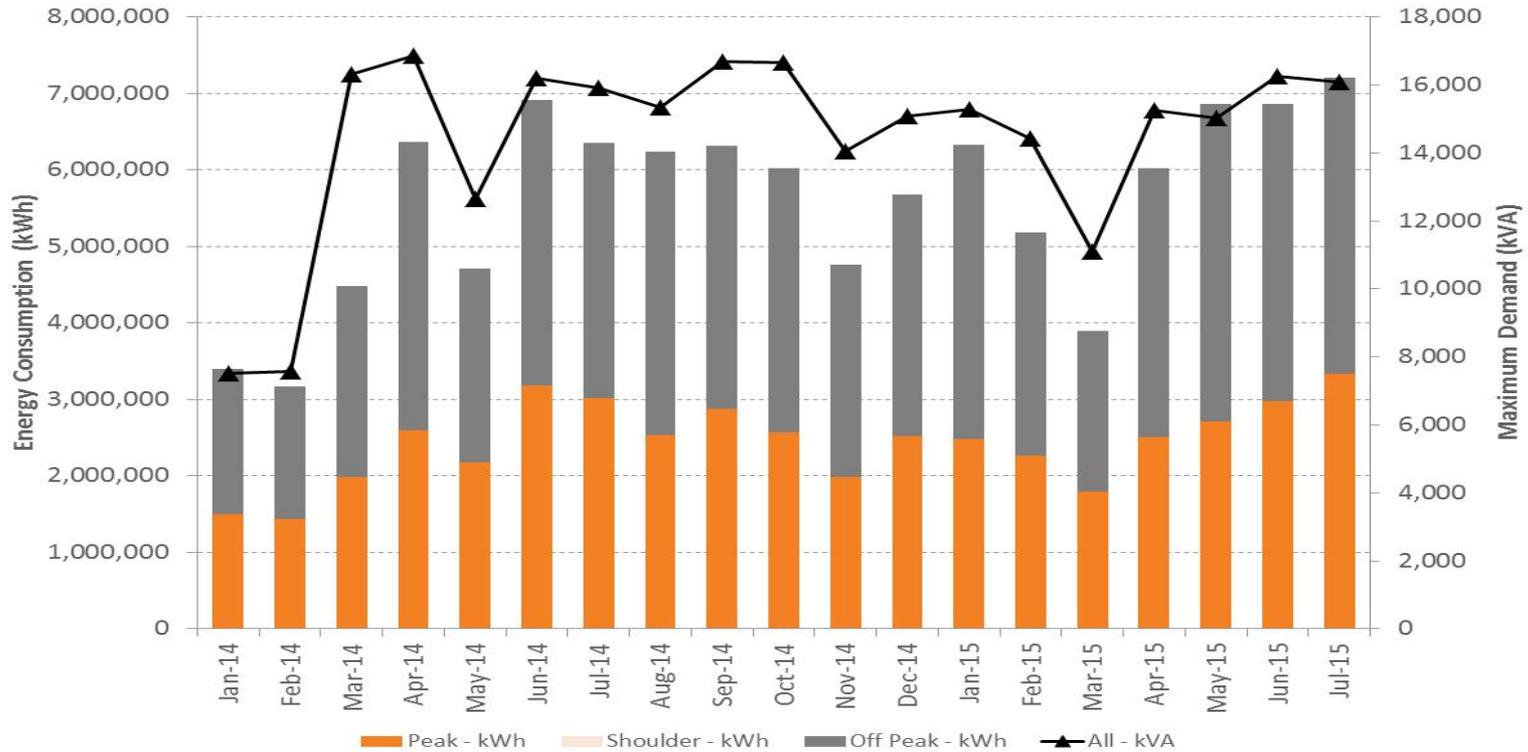
Based in 15 minute interval data



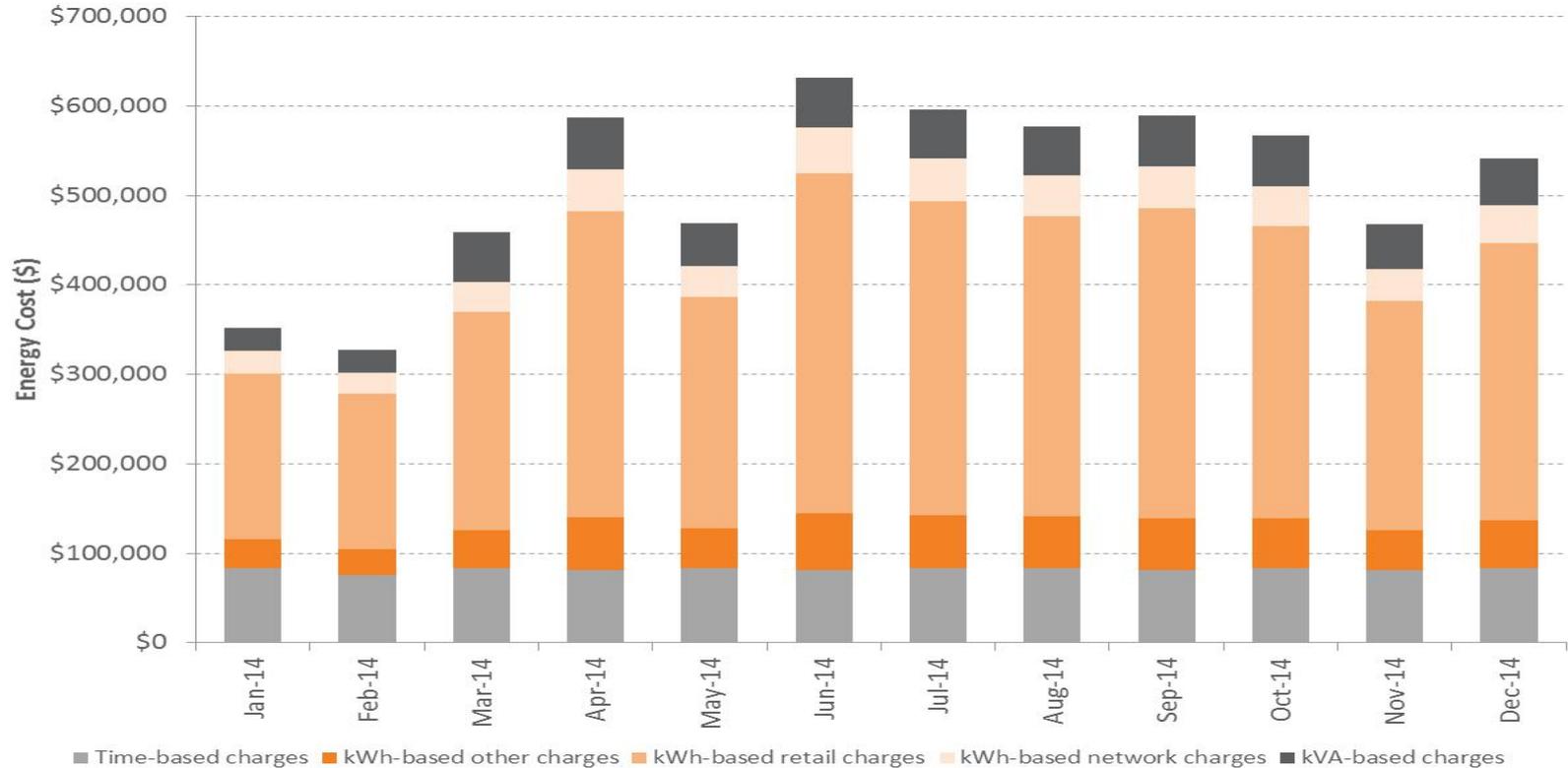
Electricity KPIs (kWh/tonne)



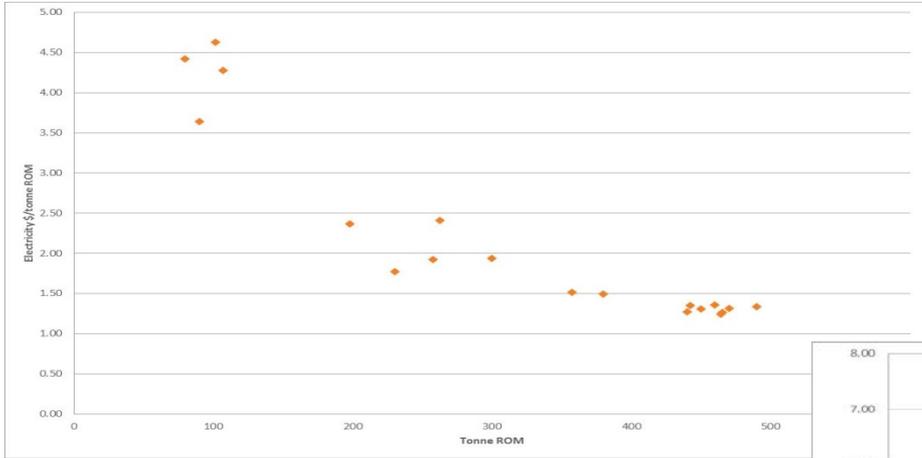
Breaking down time of use



Applying differential costs

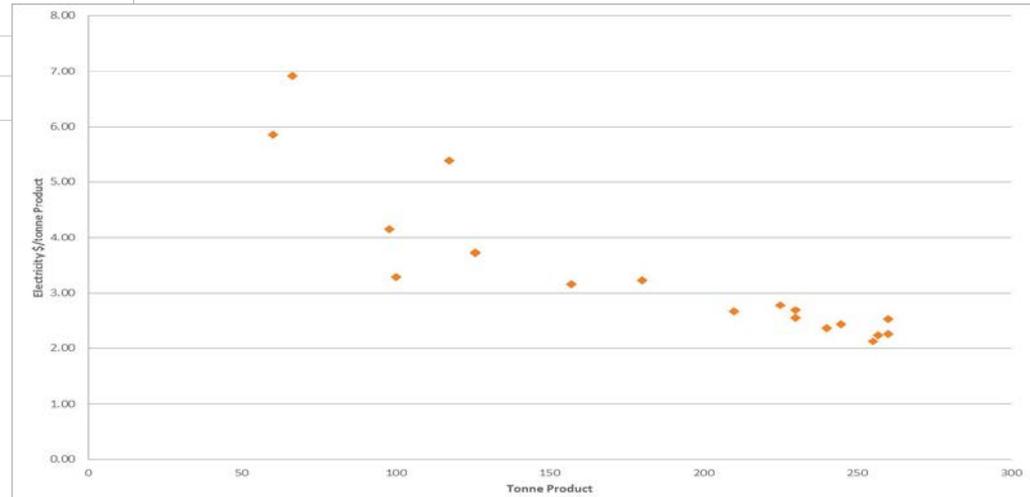


Electricity cost KPIs

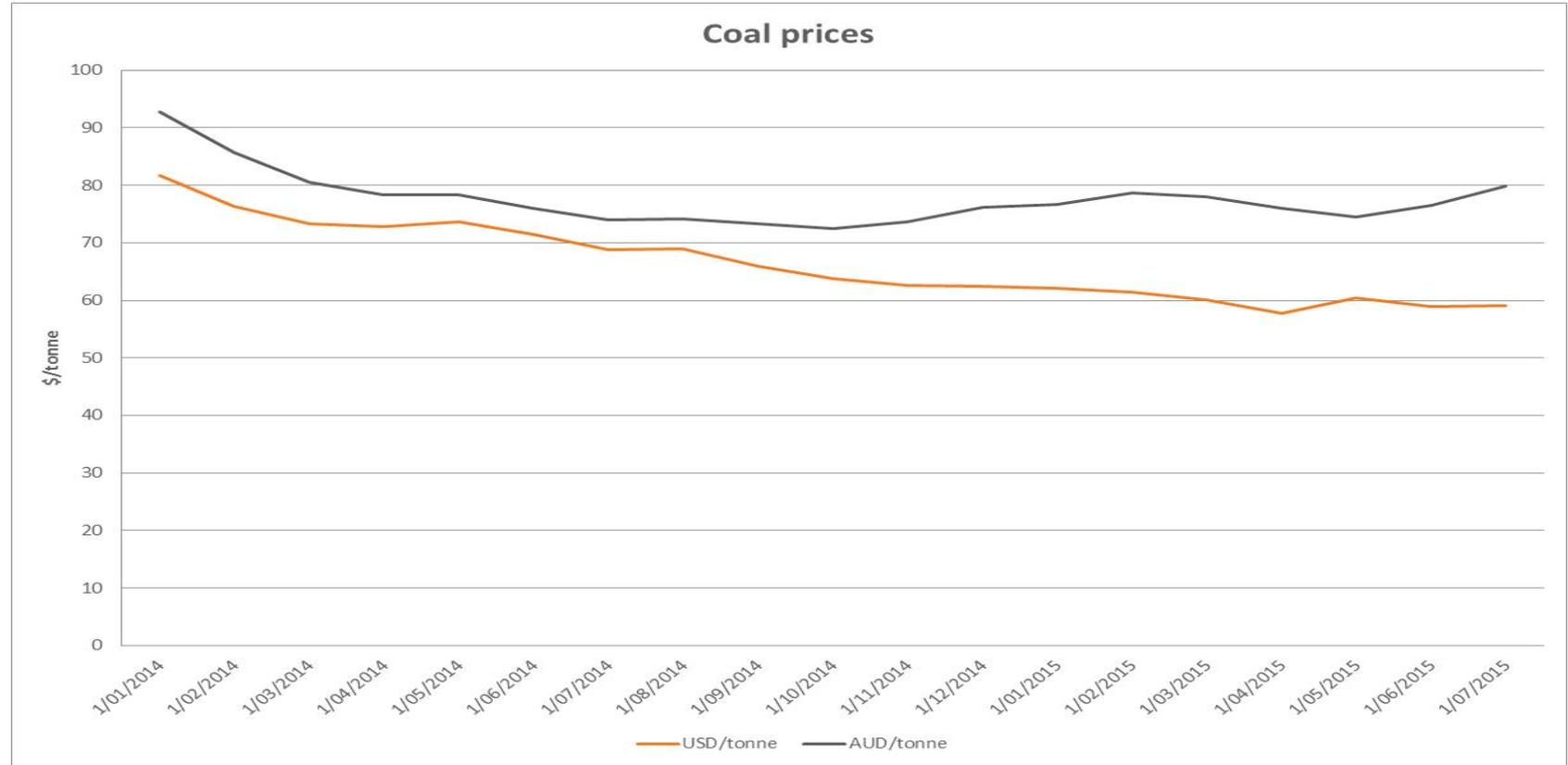


Electricity \$/tonne ROM

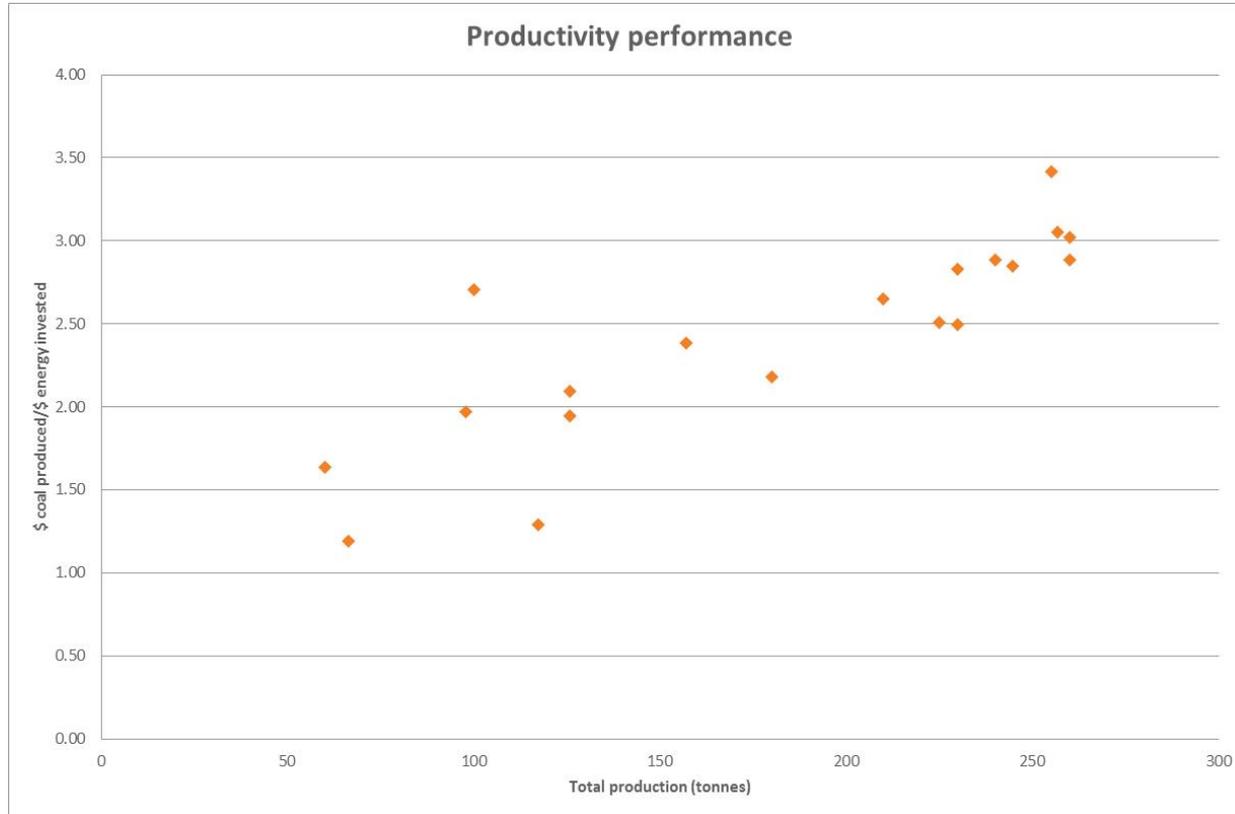
Electricity \$/tonne product



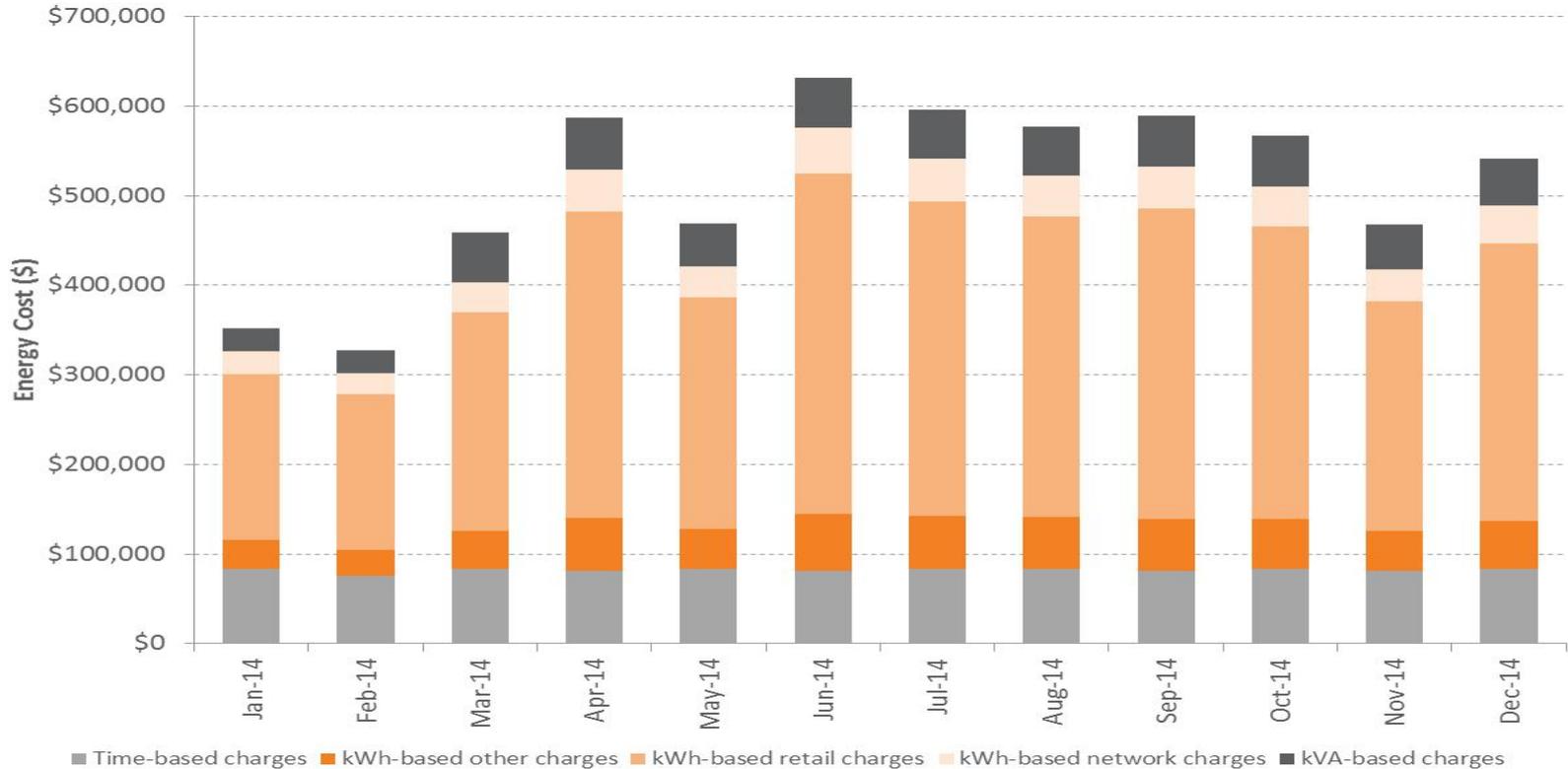
Commodity prices and exchange rates are not static



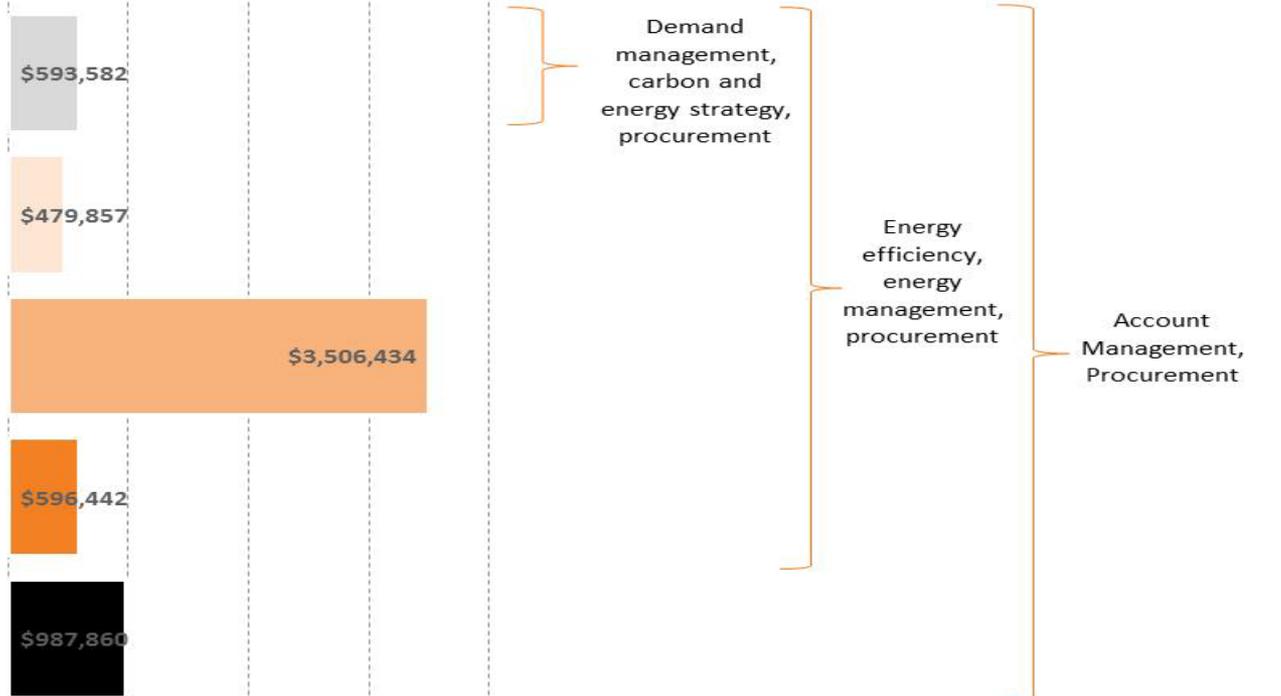
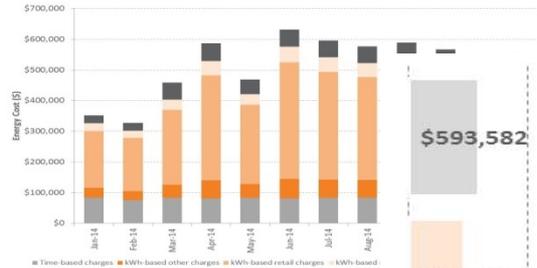
Electricity productivity KPI



How can this be improved?



How can this be improved?



■ Time-based charges ■ kWh-based other charges ■ kWh-based retail charges ■ kWh-based network charges ■ kVA-based charges

What does this mean?



Policy

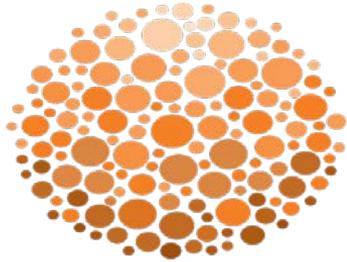
- What is the aim?
- Economy-wide requires a commodity focus
- Corporate performance is complex to generalise – company specific KPIs
 - Company-specific KPIs
- Publicly available information sets are not adequate to inform energy productivity outcomes

Site improvement

- Understanding what your \$ energy buys is important
- Considering value of product sold can obscure results
- Energy efficiency is not the whole answer
 - Contracts should be reviewed and renewed
- Link to commodity performance through sales value



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