Section 12L Roadshow Case Study

September 2016

Agenda

- Who we are
- Project Case Study: Energy User 1
- What is important for you to know
- Questions

Cova Advisory and Associates

- We are an advisory consulting firm specialising in Government Grants and Incentives.
- We also advise on matters related to green finance, as well as carbon and energy policies and strategies.
- We are a SANAS Accredited Measurement and Verification Inspection Body (EEMV0007)
- Cova has secured over R1 billion in after tax grants and incentives for clients in the last three years.

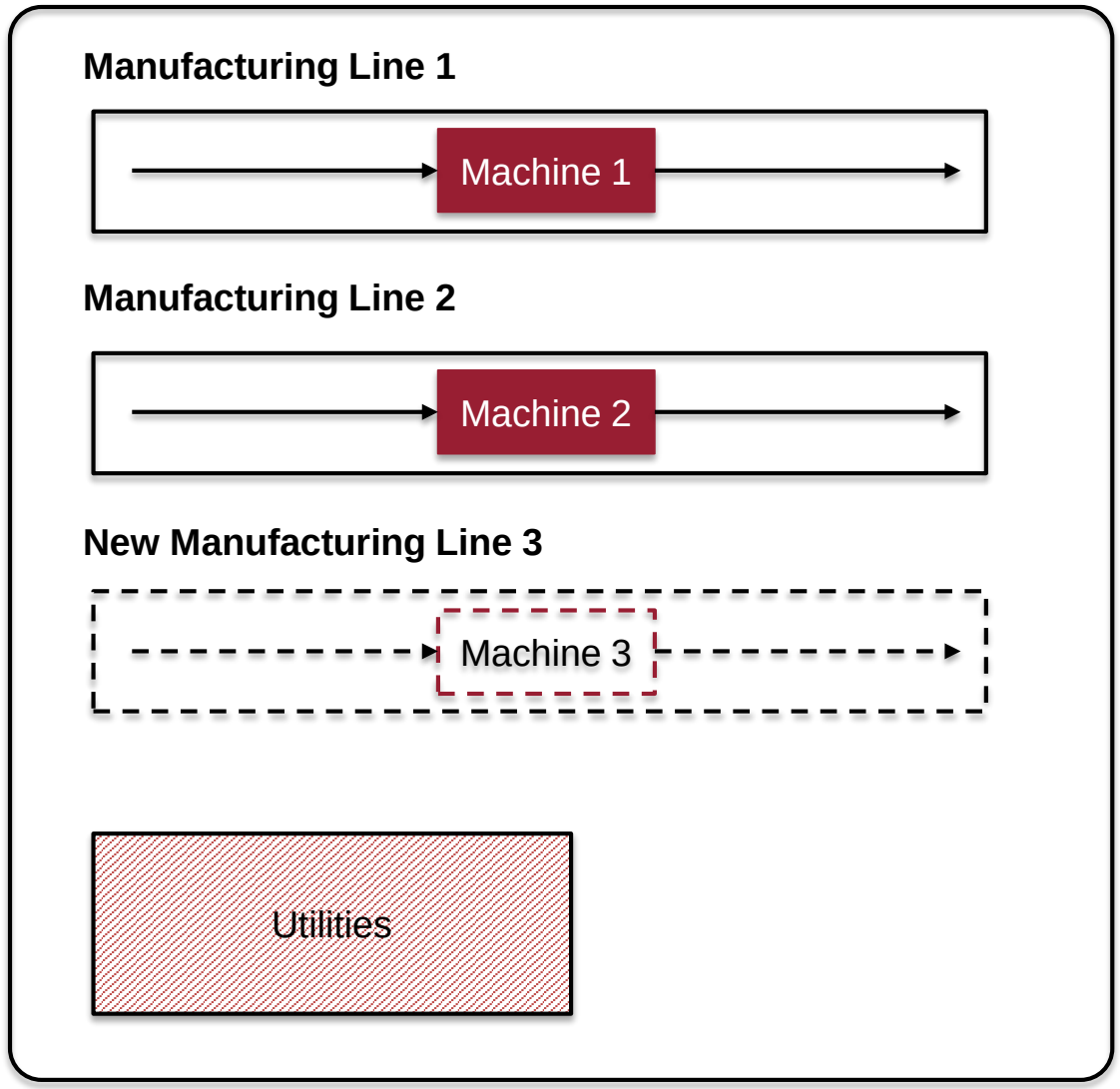
Tumelo Chipfupa
Director: Energy Team

Pieter de Villiers
Senior Energy Manager

Case Study: Energy User 1

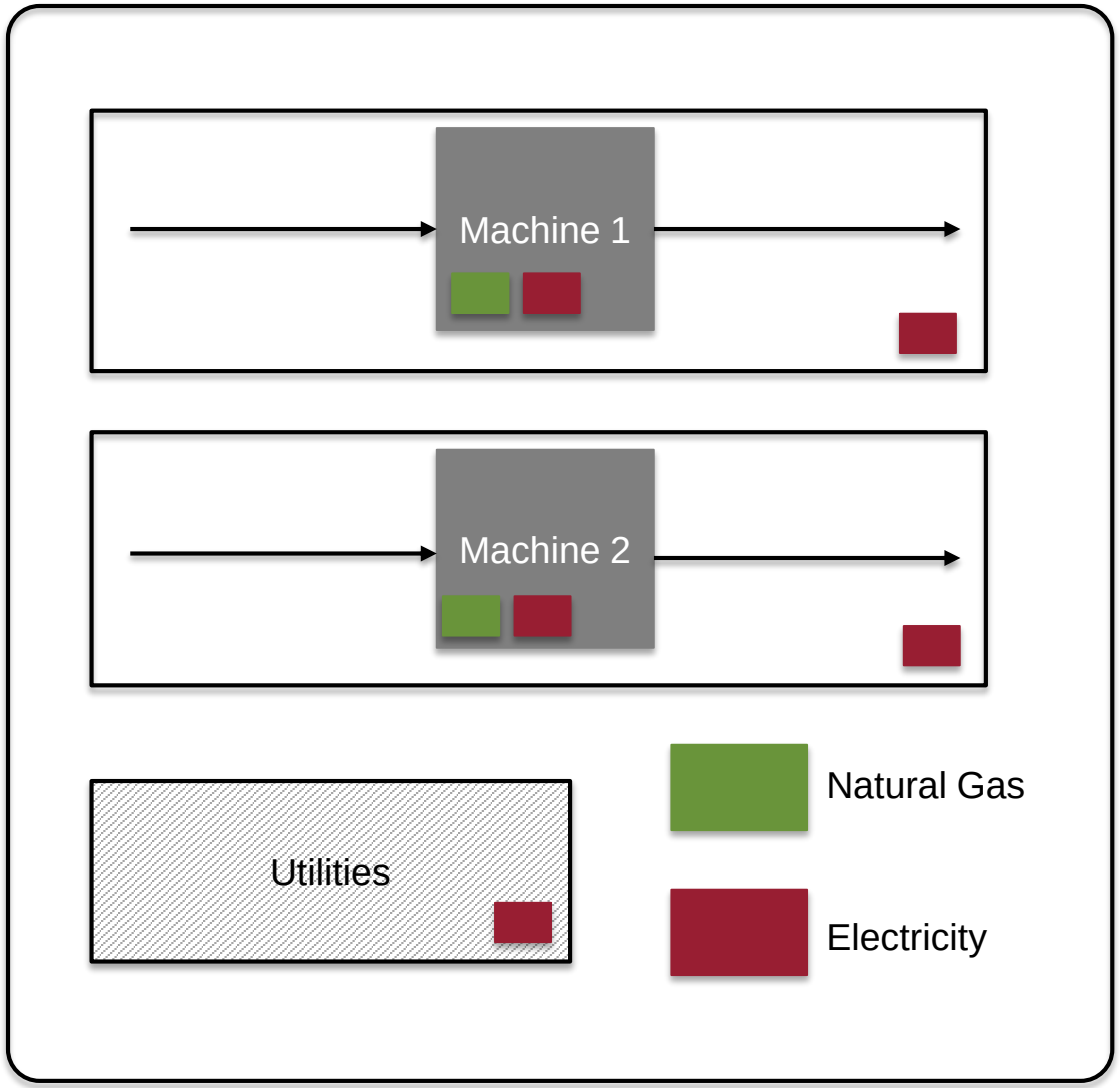
- Project: Increasing Manufacturing Capacity of the Plant (expansion project)
- Two existing manufacturing lines
- The project includes the addition of a third manufacturing line
- The new (third) manufacturing line includes Installation of modern energy efficient equipment

Case Study: Energy User 1



- Main energy sources used:
  - Natural Gas
  - Electricity
- Largest energy source is natural gas
- The biggest energy consumers on the manufacturing lines is machine 1 and 2.
- Machine 1 and 2 consume more than 75% of the total energy consumption.
- <u>Metering:</u>
  - Natural gas – hourly data available
    - Machine 1 and 2
    - Whole site
  - Electricity consumption – half-hourly data available
    - Machine 1 and 2
    - Whole Site
  - No separate metering on in rest of manufacturing lines and other plant areas

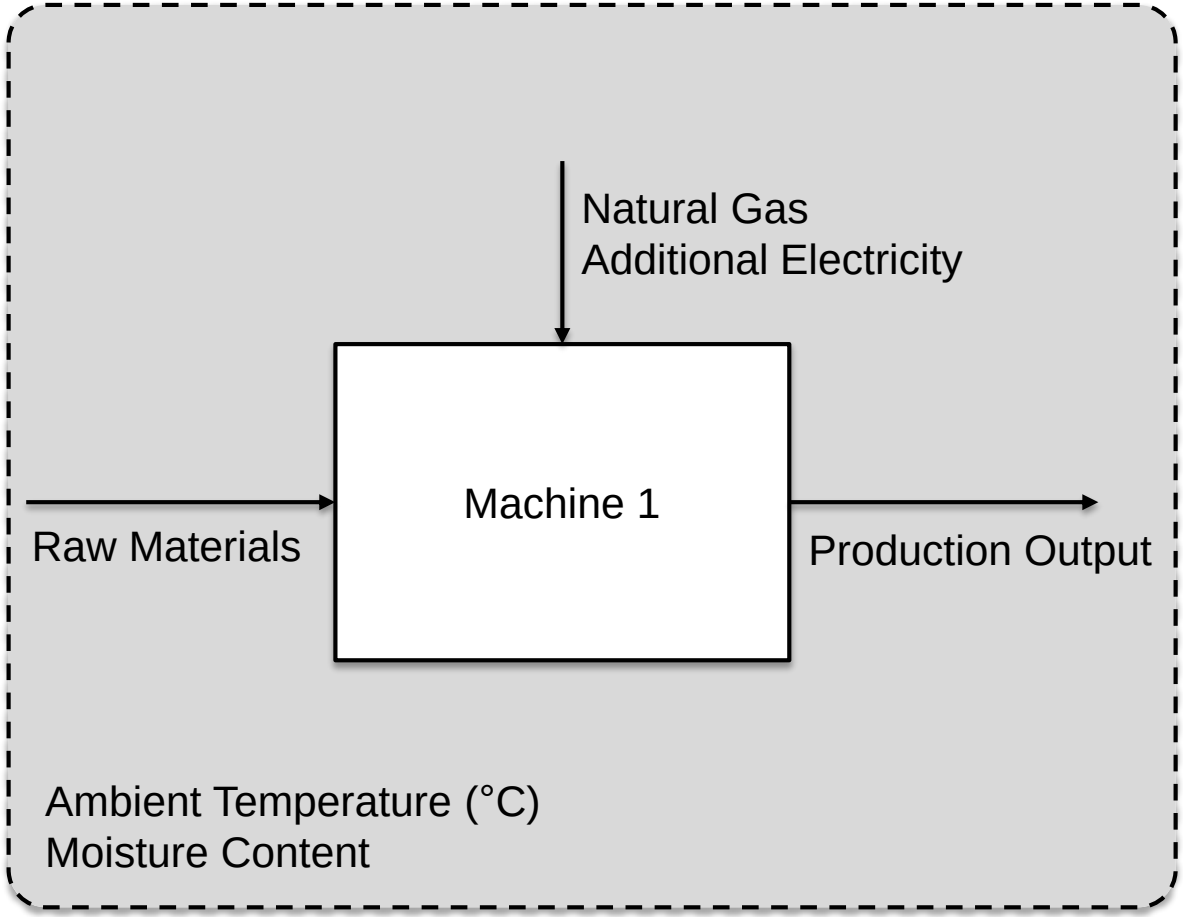
Case Study: Energy User 1



- <u>Measurement Boundary:</u>
- The options for the measurement boundaries include:
  - Whole Facility; or
  - Retrofit Isolation
- A retrofit isolation approach with key parameter measurement was chosen as measurement boundary option.
- Energy baseline models developed for each Machine separately
  - Energy governing factors for Machine 1 and Machine 2 were different
  - Machines 1 and 2 account for over 75% of the overall site energy consumption
  - Robust baselines for Machine 1 and 2 is important
- Energy baseline model was developed for the remainder of the site

Case Study: Energy User 1

- **Each Machine's energy drivers are Machine specific**



Possible Energy Governing Factors

- Production
- Moisture content in raw materials
- Ambient temperature
- Machine age / Insulation
- Product changes

Case Study: Machine 1

Machine 1: Multivariable Regression Analysis

Regression Statistics	
R Square	0,92
Adjusted R Square	0,92
Standard Error	39,39
Observations	361
Significance F	2,36E-189

	Coefficients	P-Value
Intercept	976,54	2,76E-21
Mix of inputs	-5,52	7,69E-73
Production	4,00	5,29E-75
Change in Product Type	-17,51	0,002388
Machine Age	-0,18	1,86E-08
Ambient Temperature	-1,01	0,133
Humidity	0,01	0,922
Precipitation	-0,33	0,40

Case Study: Machine 2

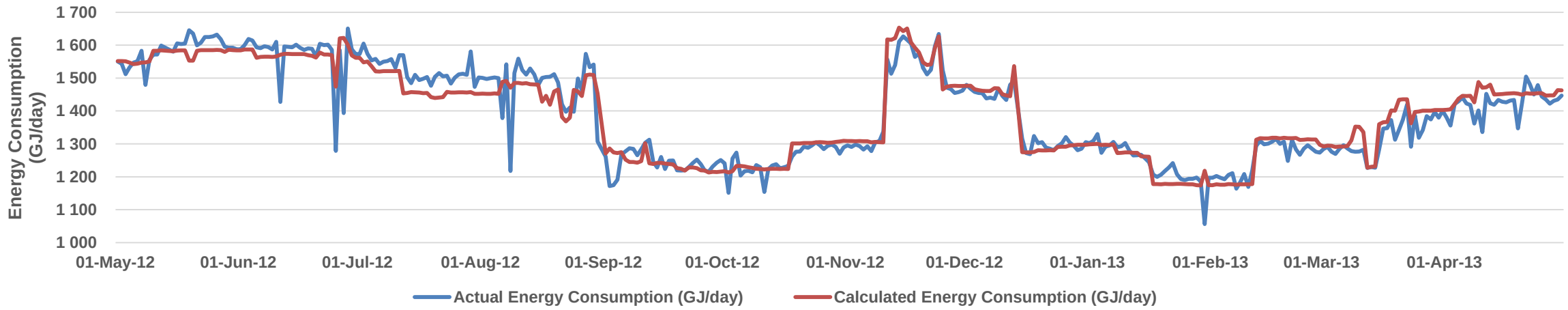
Machine 2: Multivariable Regression Analysis

Regression Statistics	Baseline
R Square	0,79
Adjusted R Square	0,78
Standard Error	40,48
Observations	357
Significance F	2,55E-111

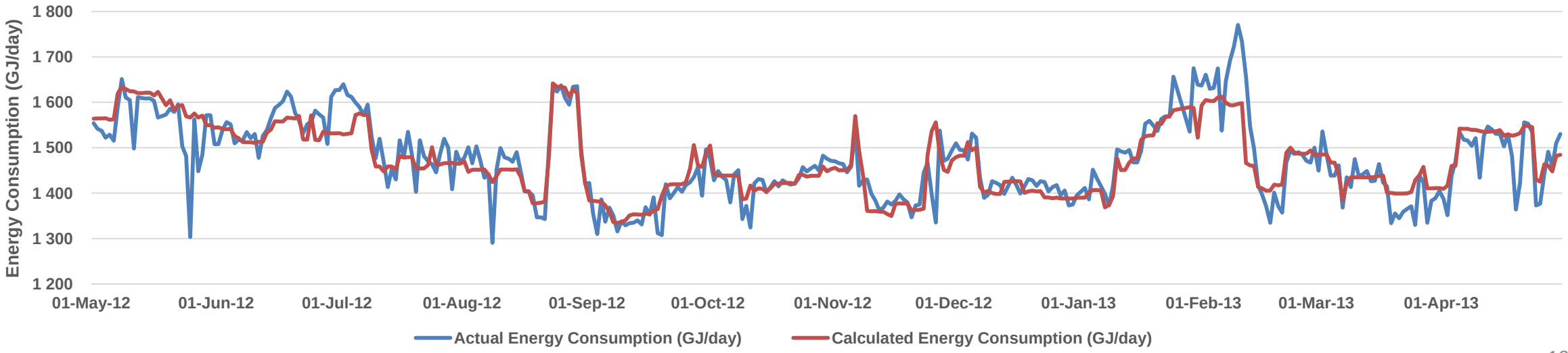
	Coefficients	P-Value
Intercept	837,92	1,40E-22
Mix of Inputs	-4,74	4,68E-16
Production	2,41	3,83E-22
Change in Product Type	-4,85	0,30
Machine Age	0,08	0,02
Ambient Temperature	-0,15	0,80
Humidity	0,09	0,51
Precipitation	-0,79	0,04

Case Study: Energy User 1

Machine 1 Model Fit

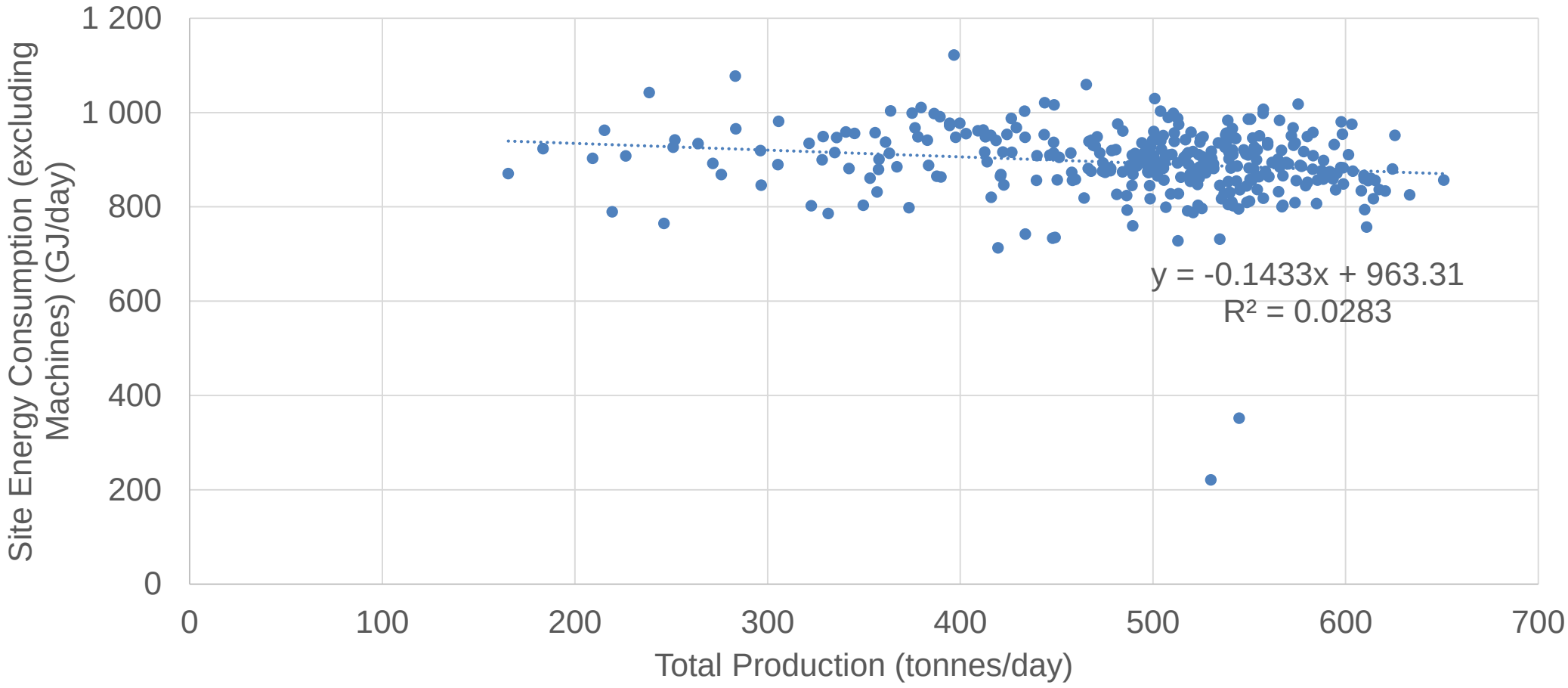


Machine 2 Model Fit



Case Study: Energy User 1

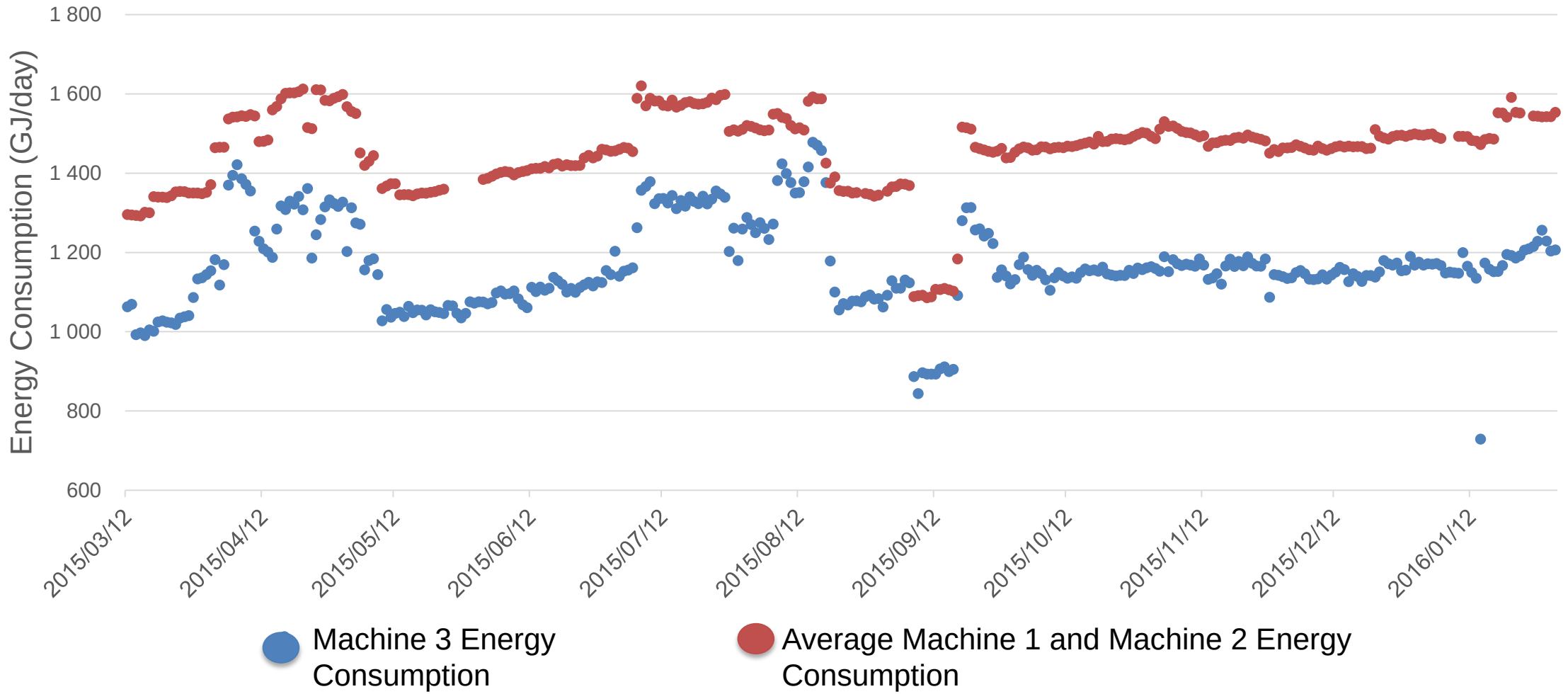
Rest of the Site: Production was not a good energy driver for the remainder of the site



Electricity consumption for the remainder of the site was assumed to be constant

Case Study: Energy User 1

In order to determine the Energy Savings – Average Baseline of Machine 1 and Machine 2 is compared with the new machine, Machine 3



Case Study: Energy User 1

- Key challenges with the project:
  - The energy savings expected was difficult to achieve, although the new equipment was more energy efficient.
  - The market demand for the product changed. When making a different product (due to the different raw material mix), the new equipment did not operate as optimally.
  - During the commissioning, the plant experienced problems. Under the conditions again, the new equipment did not operate optimally.

What is important for you to know?

- The quality of energy data is very important for building an energy baseline equation and determining energy savings.
- Direct or online metering is more accurate.
- The more energy metering for different sections of your facility or equipment, the better.
- The more granular the data, the better (i.e. daily is better than yearly).
- Annual calibration of metering equipment is a requirement for Section 12L.

Questions?

Contact Us

Tumelo Chipfupa tchipfupa@cova-advisory.co.za 082 789 8915	Pieter de Villiers pdevilliers@cova-advisory.co.za 082 614 0642

www.cova-advisory.co.za