The following presentation was given at:

The SCAF 2016 Cost Estimating Challenge

Tuesday 19th April 2016
BAWA Centre, Bristol

SCAF conference
Case Study Workshop

Rolls-Royce Plc

- Alastair Maxwell, Patricia Patilla Sanchez

- 19th April 2016 - Bristol

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Introduction

- Alastair Maxwell – Life Cycle Cost Lead
  - Maths and German graduate
  - Life Cycle Cost experience less than a year

- Patricia Patilla Sanchez – Solution Design & LCC Lead
  - Aerospace Engineer
  - Life Cycle Cost experience less than a year

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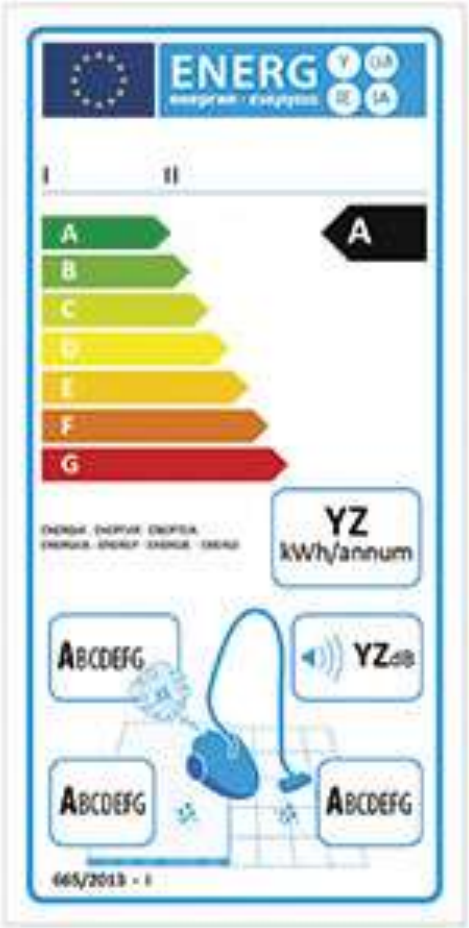
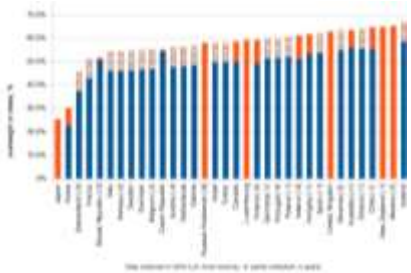
Purpose and scope of the project





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General data gathering approach

- **Data Sources**
  - John Lewis Website
  - Official Journal European Union – No 665/2013

- **Data Normalisation and Aggregation**
  - Vacuum Cleaner considered only for domestic use
  - UK Household growth trend in line with last 20 years
  - Vacuum cleaner lifecycle is 8 years (live in a disposable world, repair costs not accounted for!)
  - 10 % UK Households replace vacuum annually
    - New Vacuum – 80%
    - Second Hand Vacuum – 20%

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General data gathering approach

- **Cleaning Tasks Details**
  - 1 vacuum cleaner per UK household
  - Annual Average cleaning tasks is 30
  - Time to hoover average UK floor space is 30 min
  - Including an obstacle factor of 15% is 35 min

- **Electricity Usage and Spend**

Average price per kWh 13.86 p	Per Household	Total UK (2016)
Current electricity usage per year	31.05 kWh	850 000 MWh
Current spend per year	4.30 GBP	120 m GBP

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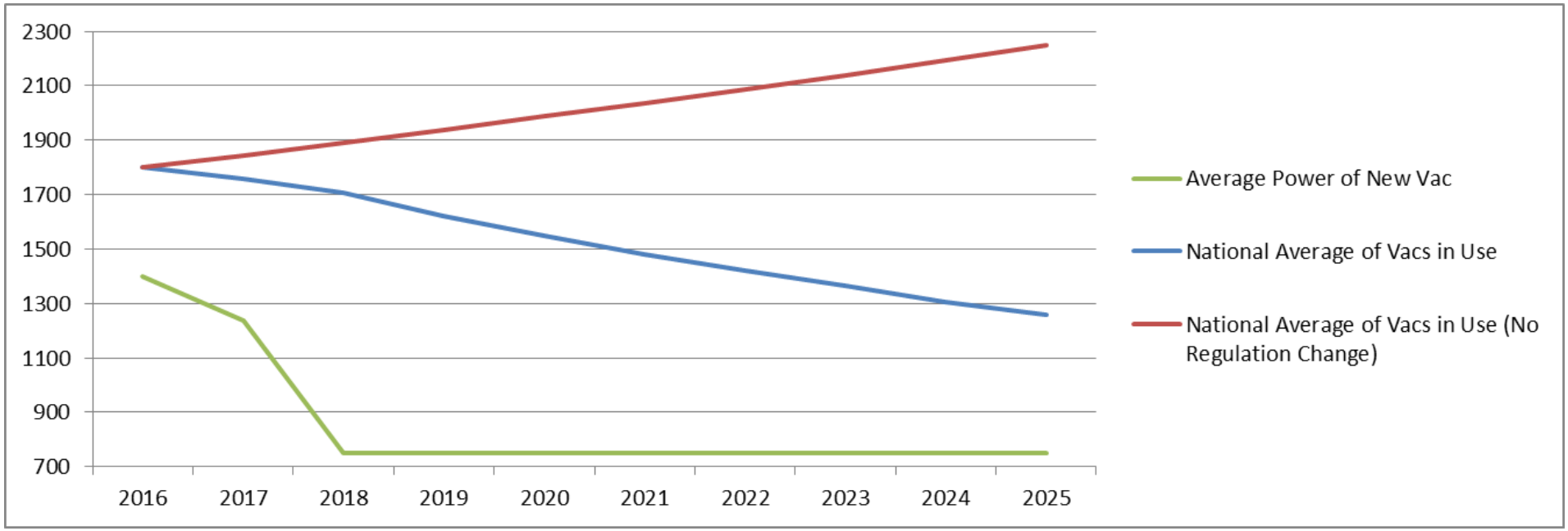
Data Analysis

- **Average Wattage of Vacuums in use in the UK**



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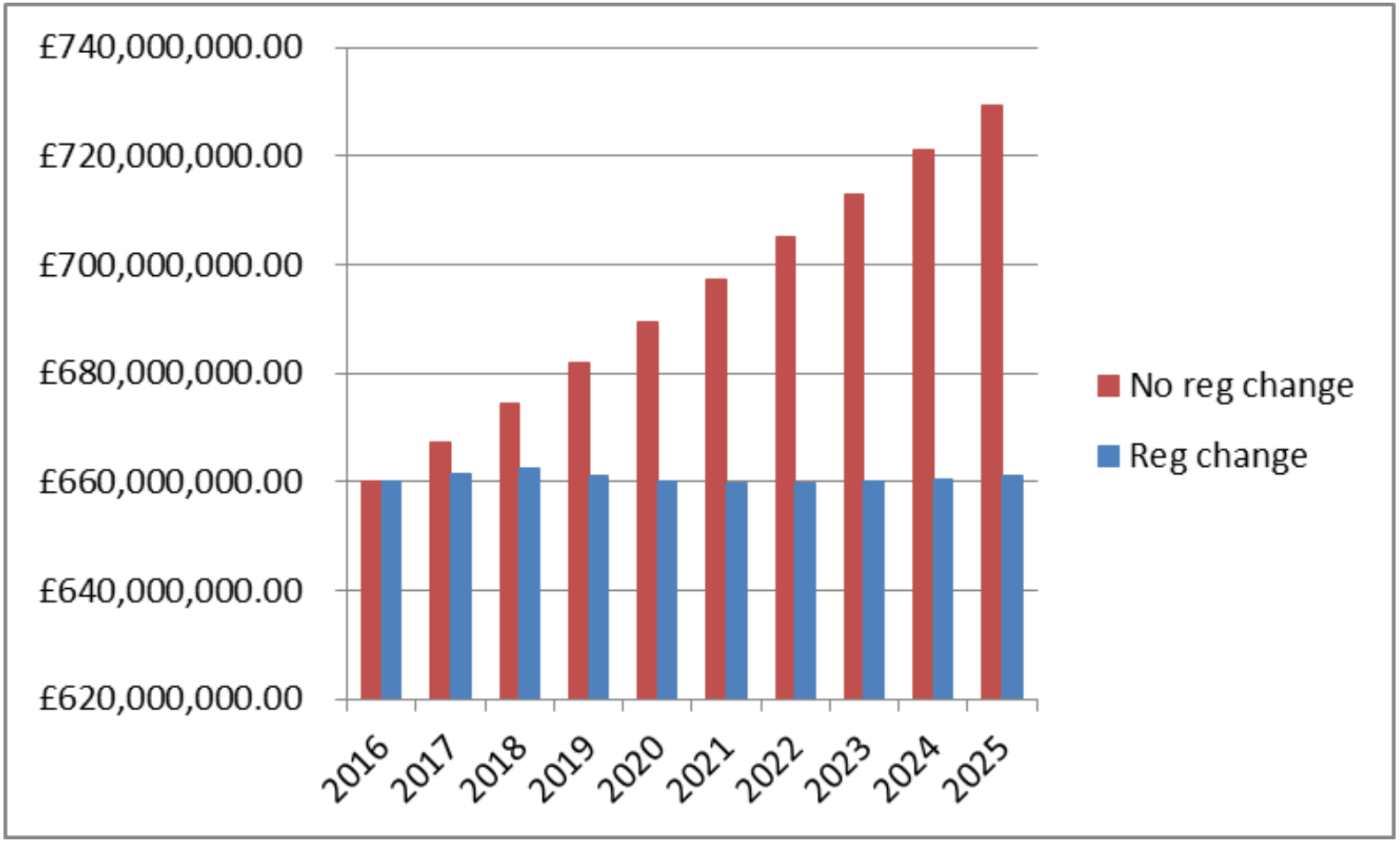
Data Analysis

- **Annual Cost of Vacuums to the UK**



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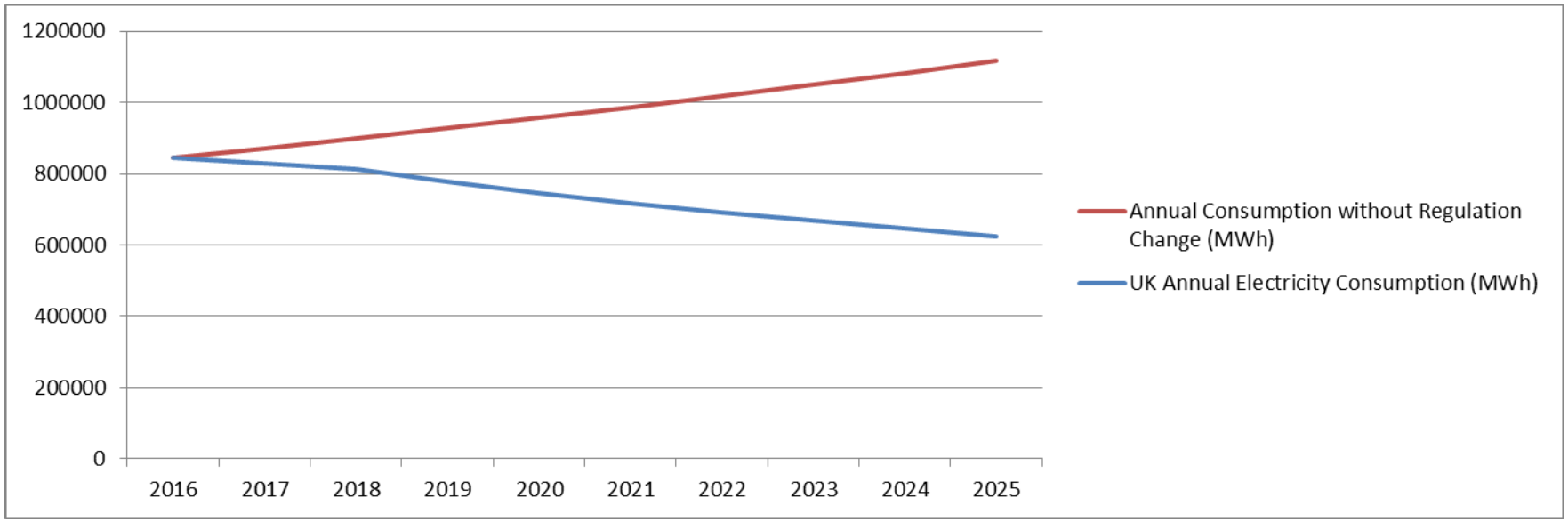
Data Analysis

- **Average Vacuum Power over ten year forecast**



- Saving 2.4m MWh
- Equivalent to nearly 1.5 megatonnes of CO_2

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Data Analysis

Uncertainty Bounds for Sensitivity Analysis

	Min	Current	Max
Vacs replaced annually	5%	10%	20%
Vacs replaced with new	60%	80%	90%
Average Power from 09/2014-09/2017	1300	1400	1500
Average Power from 09/2014-09/2017 – CHOOSE LOWER	700	1400	1500
Average Power from 09/2017 on	700	750	800
Time taken to hoover floor space	20	30	60
Cost per kWh	13	13.86	18

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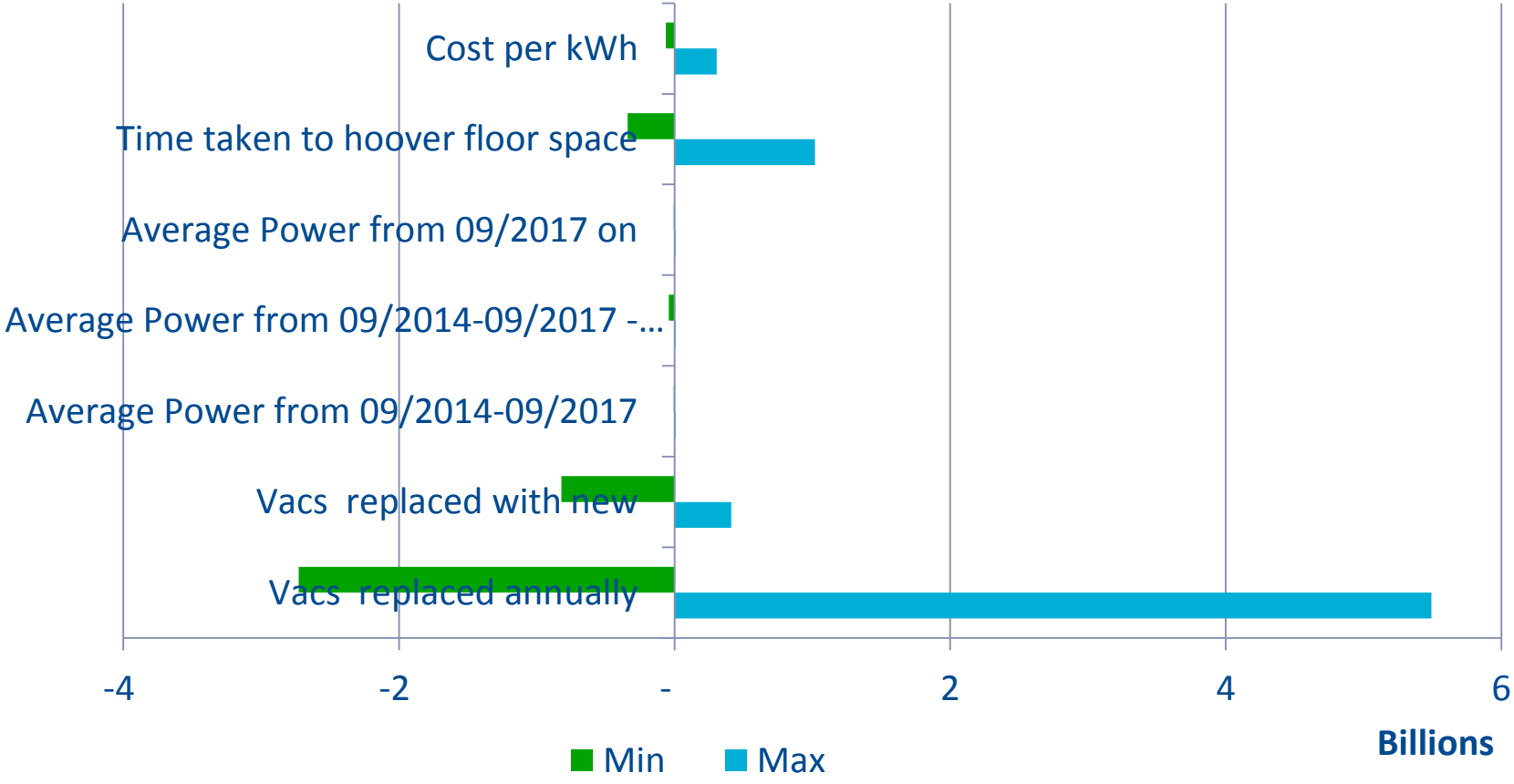
Data Analysis – Sensitivity Analysis

Total cost of vacuum cleaners in the UK over 10 years



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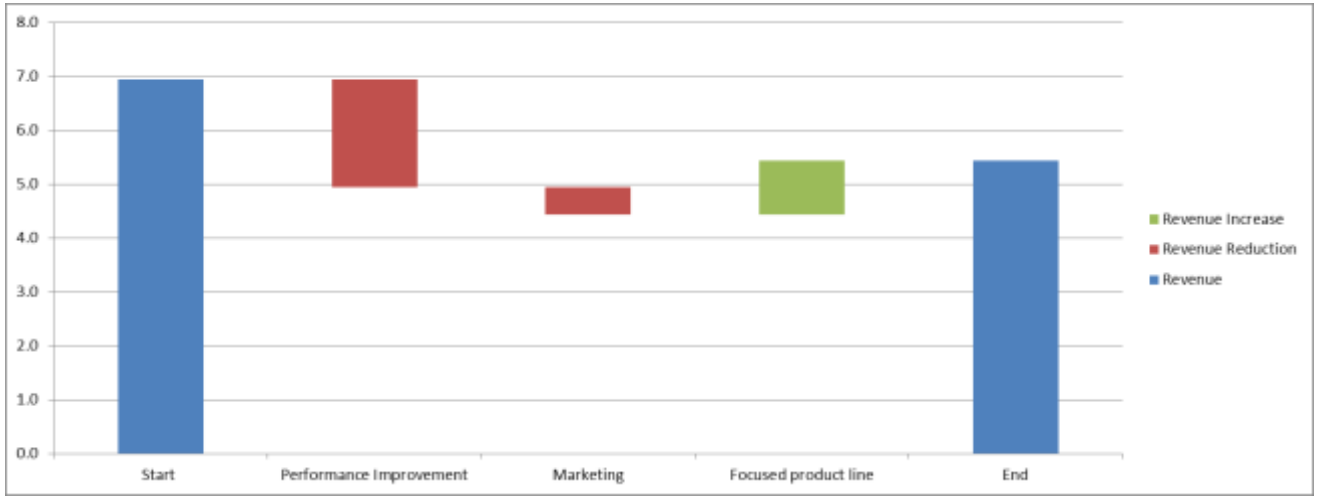
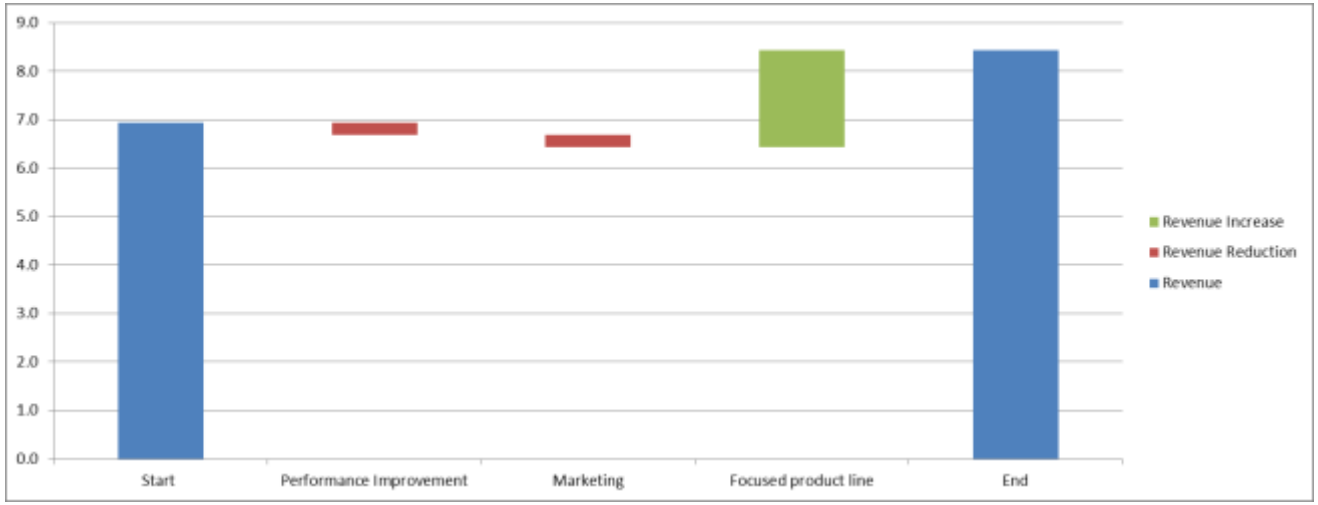
Data Analysis – Producer's view

Wattage is a marketing tool



Wattage is not a marketing tool



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Summary

- The cost of buying vacuum cleaners has a much greater impact than cost of electricity.
- Forecasted energy consumption does not include reduced performance of cleaners or if wattage improves dpu and therefore time spent cleaning reduces.
- Sensitivity to wattage is minimal in terms of economic impact compared to the impact of the time taken per cleaning task over 10 year period.
- It would be possible to analyse producer impact by seeing variation to margins etc.
  - More analysis would be required

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Lessons Learnt

- Set a clear target for the research and understand fully the question to be answered.
- Don’t work on it at the end of a long day at work!
- Step out of the detail regularly.
- Don’t be too ambitious
  - Producer viewpoint, Weibulls…
  - Potential impact of Brexit after 23rd June referendum

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