**Element Energy Coding Challenge – Smart Meter Data**

The challenge is designed to give us an understanding of your coding level and style of coding. Feel free to use Google to help you answer the question (e.g. for reading relevant Python documentation), but you should not copy and paste any code directly from the internet.

Please use [doc strings](https://www.pythonforbeginners.com/basics/python-docstrings) in your program to document the purpose of each class/function that you have written to complete the challenge.

**Challenge Rules**

* Please spend no longer than 1.5 hours of your time on this challenge.
* Please use Python 3.4 (or a later version) to complete the challenge.
* Use of the [Pandas Python package](https://pandas.pydata.org/pandas-docs/stable/) for data analysis is recommended but not a requirement.
* If you don’t have Python installed on your computer, you can use an online editor (<https://repl.it/languages/python3>) to write and test your code.
* Once you have completed the challenge, please email your code (.py file(s)) and any supplementary information to: [julie.taylor@element-energy.co.uk](mailto:julie.taylor@element-energy.co.uk) with the subject **EE Coding Challenge Response – Your Name**

**Introduction**

You have been tasked to create a tool that analyses domestic electricity consumption captured using a smart meter at a half hourly frequency. Your code should be easy to understand and extend so it could be easily built upon and/or integrated into an existing tool. We have supplied a csv file containing the smart meter data, which is called “ee\_coding\_challenge\_dataset.csv”.

**Challenge 1**

Write a program that reads in the smart meter data from the csv file and enables the smart meter data to be filtered by meter\_id, month and year.

**Challenge 2**

Extend your program in Challenge 1 to include data cleaning functions to identify and correct any basic smart meter consumption data errors, **for example,** negative consumption readings.

**Challenge 3**

Assume that all households in the smart meter dataset are on a fixed rate tariff that has a flat rate of 0.15p/kWh. Write a program that calculates the estimated electricity usage cost for each household, for each month in the data set using **cleaned** smart meter data.

Some households may have saved money if they were on a different tariff, for example an Economy 7 rate tariff. Extend your program to calculate how much the household could save on their monthly bills if they switched to an Economy 7 rate tariff.

Use your function to produce a table like the following for each month of data you have available:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Meter\_id | Month | Year | Electricity cost (£) on current flat rate tariff | Potential cost savings (£) if household was on an Economy 7 tariff |
| 100 | January | 2013 | X | Y |
| … | … | … | … | … |

You may need to use Google to find out more information about the Economy 7 tariff. Please add comments to your program to record any assumptions you make.