

# Saving Electricity

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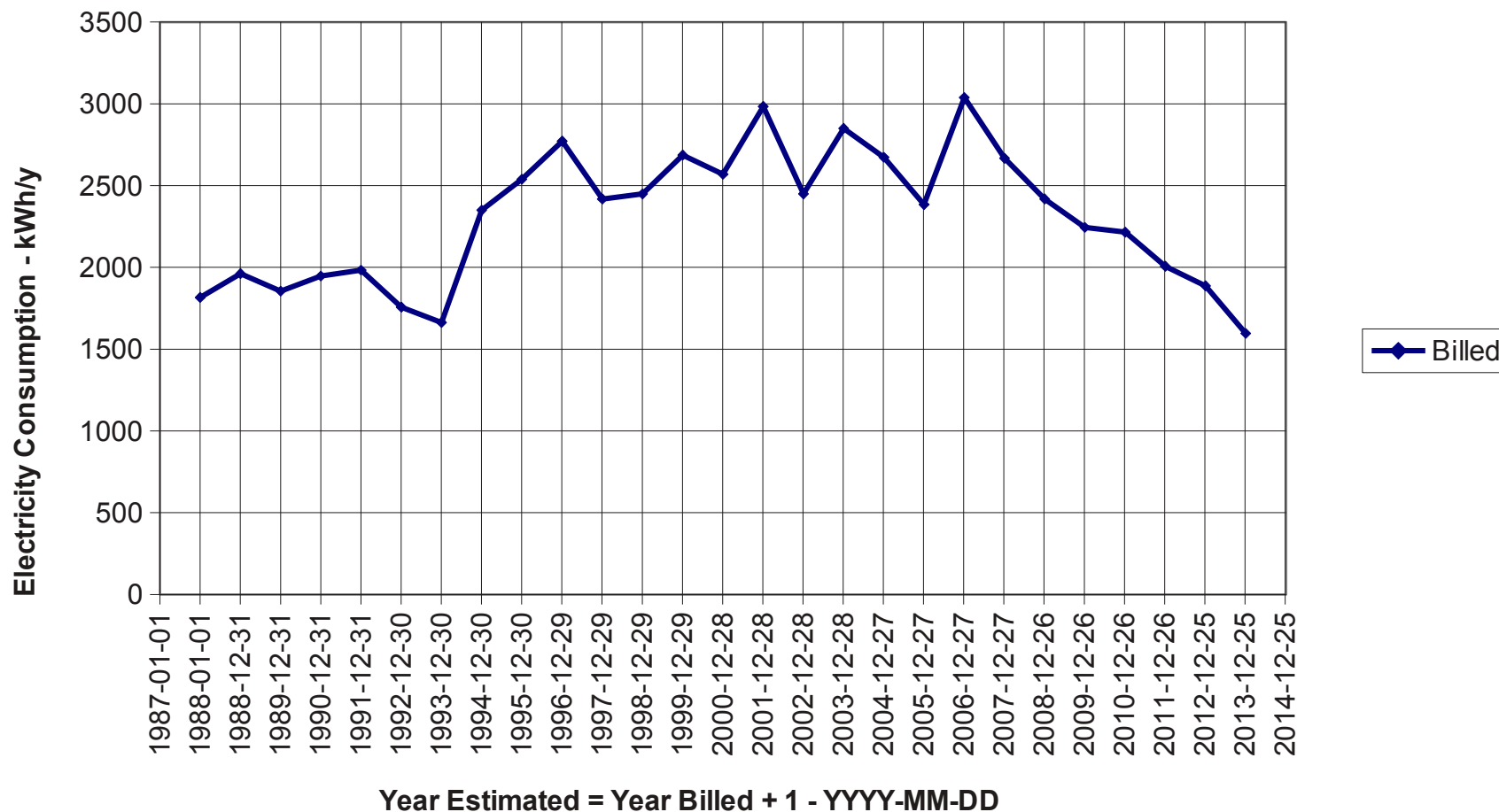
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# Saving Electricity

- Total Annual Electricity Consumption from Bills
- Individual Appliance Energy from measurements
- Savings from changed Usage
- Savings from current Best Practice appliances
- Savings from future Achievable appliances

# Annual Electricity Consumption from Bills

## Electricity Consumption from Bills v Approx Year



# Plug-in Meter for Measuring Watts, kWh and Hours etc



Maplin Code: L61AQ

# Electricity for appliances - 1

- Table of appliances & lights, start & end dates
- Power x Usage Time or Energy/cycle x Cycles
- Total Estimated Energy for 40 items >0 kWh/y
- This omits modes higher than idle or standby and 29 low usage appliances & lights

# Electricity for appliances - 2

- Sort table of items by annual electricity use
- Plot annual electricity use for 40 items  $>0$  kWh/y
- This prioritises items for electricity saving, by changing usage or replacing appliances

# Saving Electricity - 1

- Reduce Usage - e.g. of Standby
- Use existing appliance with lowest energy
  - e.g. not oven or hob but microwave
- These options cost nothing

# Saving Electricity - 2

- Replace with lower energy, Best Practice, items
- Most have Energy Labels - e.g. A, A+, A++, A+++
- Estimate Current and Best Practice electricity use
- Determine money value of Saving per year
- Payback Time is  $\text{Item price} / \text{Saving per year}$

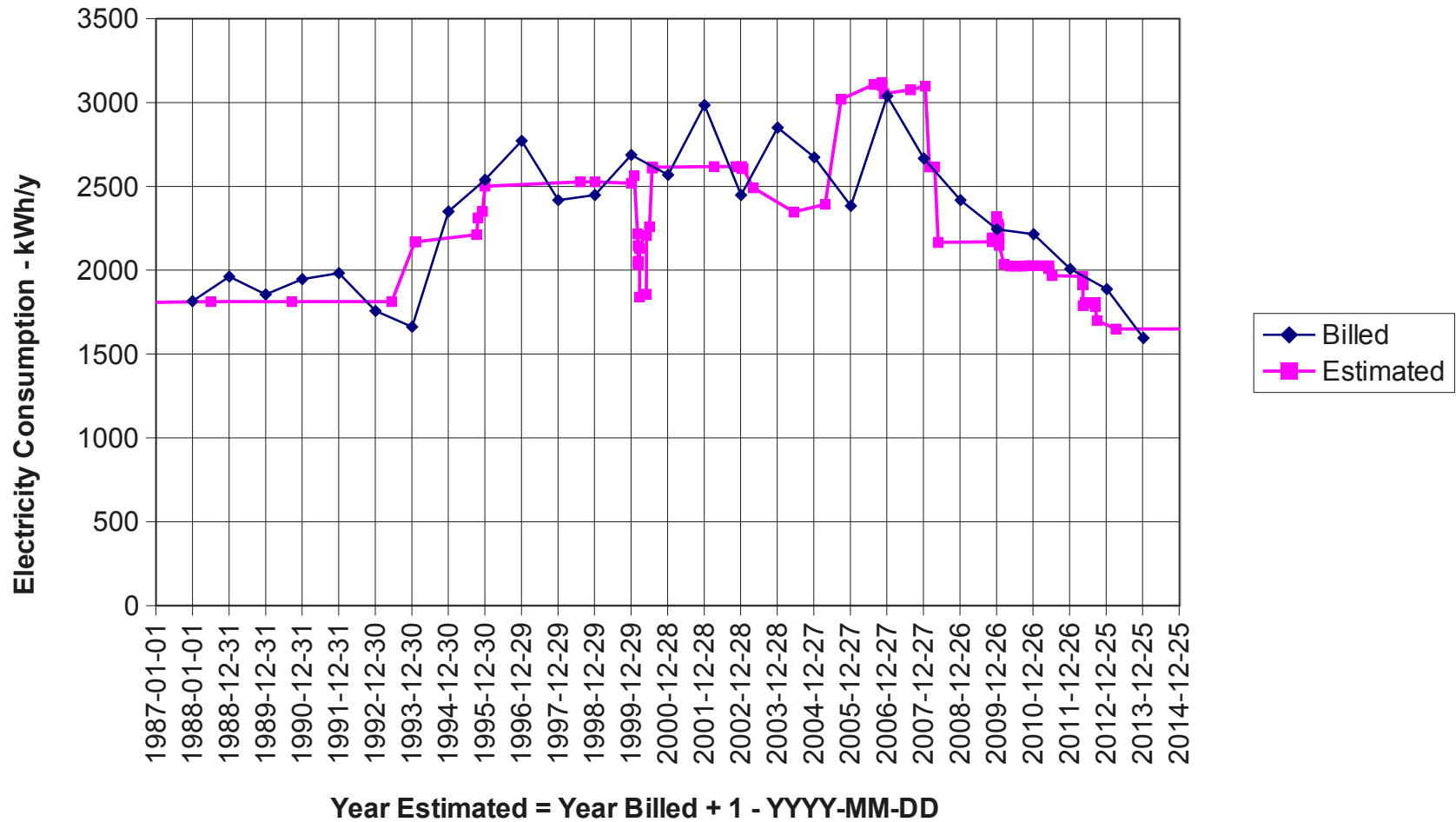


# Items, Savings, Payback Times

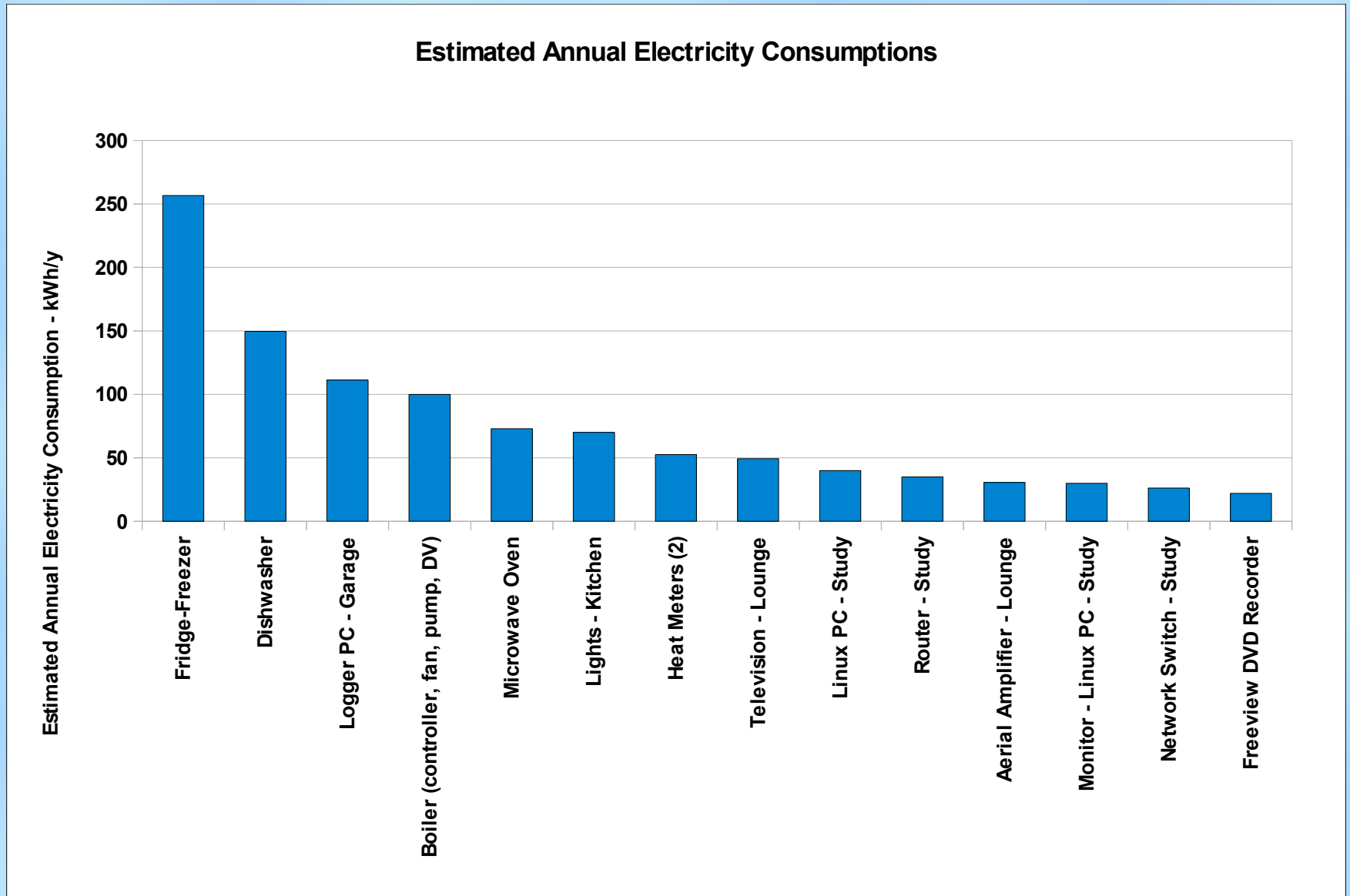
- Diverter Valve reversed                      51 kWh/y      0 y
- Lights, due to 7 of 17 to CFL      188 kWh/y
- Heating Pump, to A-rated              450 kWh/y      2.7 y
- Monitor, 17" CRT to 23" LED      140 kWh/y      9.4 y
- Logger PC, to save electricity      125 kWh/y      25 y
- PC, rebuilt to save electricity              84 kWh/y

# Annual Electricity Consumptions - Billed and Estimated

## Electricity Consumptions v Approx Year



# Estimated Annual Electricity Consumptions



# Items, Savings, Payback Times

- (Kitchen lights, T8 to T5                      26 kWh/y            6.9 y)
- (Fridge-freezer, A to A+++            160 kWh/y            19 y)
- (Dishwasher, to A++                      66 kWh/y            45 y)
- (TV, 32-in., LCD to LED            27 kWh/y            112 y)

# Applicable Scientific Laws

- Pumping - Hydraulic power, pump efficiency
- Light – Luminous Flux, Luminous efficacy
- Cold - COP of heat pump, UA of cabinet
- Wet - Mostly heating and evaporation of water
- Heat - Heating food and container
- Electronics - Display efficacy, HDD power, PS effy

# Savings - Best Practice, Achievable

- Heating Pump                      A, 86%                      91%
- Lights, from Incand.              A, 80%                      90%
- Fridge-freezer, from A            A+++, 60%                88%
- Dishwasher                        A++, 50%                91%
- Monitor, from CRT                A, 82%                      91%
- TV, from CRT                      A, 66%                      75%

# Conclusions

- Importance of choosing 'Best Practice' initially
- Identify 'Best Practice' items ahead of need
- Mandate energy labels, display at points of sale
- Estimate national savings, for policy purposes
- Consider 'Achievable' options for UK R&D
- Estimate national savings, for policy purposes

# References

- Household Electricity Survey, A study of domestic electrical product usage, R66141, Intertek, 2012.
- Best Products of Europe, <http://www.topten.eu>
- Theoretical efficiency limits for energy conversion devices, Jonathan M. Cullen, Julian M. Allwood, 2010.
- Reducing Energy Demand: What Are the Practical Limits?, Jonathan M. Cullen, Julian M. Allwood, and Edward H. Borgstein, 2011.



Thank you for your attention

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Several energy presentations are at:

[www.energypolicy.co.uk](http://www.energypolicy.co.uk)