REPIC

WEEE | BATTERIES | PACKAGING

# A new dynamic model for WEEE – a report by Lancaster University

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# Objectives of the study

- Improve intelligence on the relationship between EEE placed on the market POM and WEEE generated
  - Produce more accurate forecasts for WG
  - Support future Government policy and target setting
  - Support industry planning and investment
- Produce an enhanced flow model for the UK
  - Inclusion of socio-economic factors
  - Link ‘top down’ data generation with ‘bottom up’ real world data
- Identify further work to improve data for unreported WEEE and produce a dynamic flow model

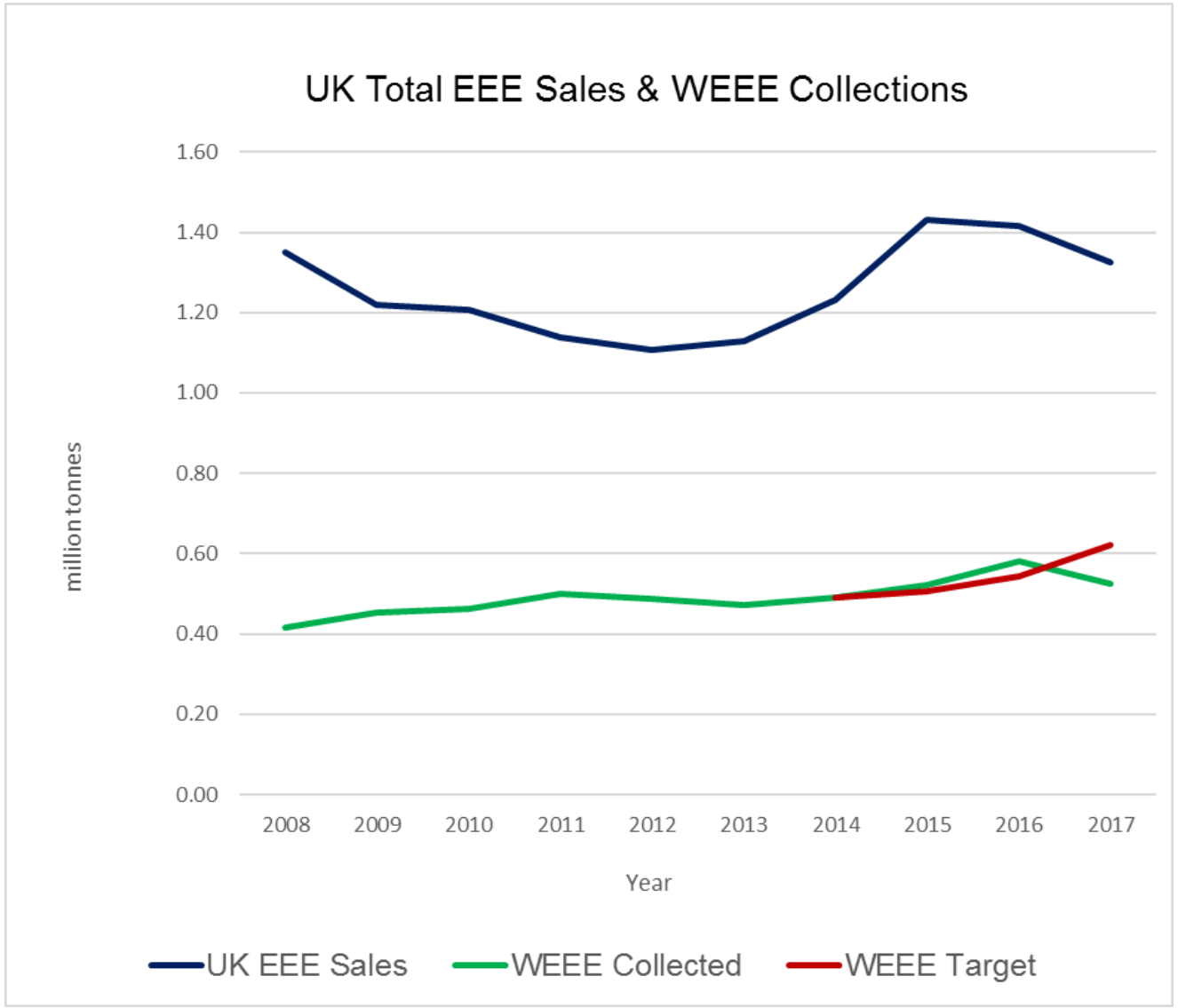
# Targeting WEEE

- To set sound targets we need to know the WEEE that is available
  - Quantify flows for desirable and undesirable WEEE
  - Recognise the factors that determine WEEE or end of first life EEE
  - Most advanced model *Dutch WOT* doesn't have socio-economic variables and is not tailored to the UK WEEE market
  - Requires a new dynamic model with an increased number of variables

WOT  Waste Over Time

# WEEE collected against compliance targets UK

- EEE POM reported by Producer Compliance Schemes
- WEEE collected through Producer Compliance Schemes
- Defra target for Producer Compliance Schemes

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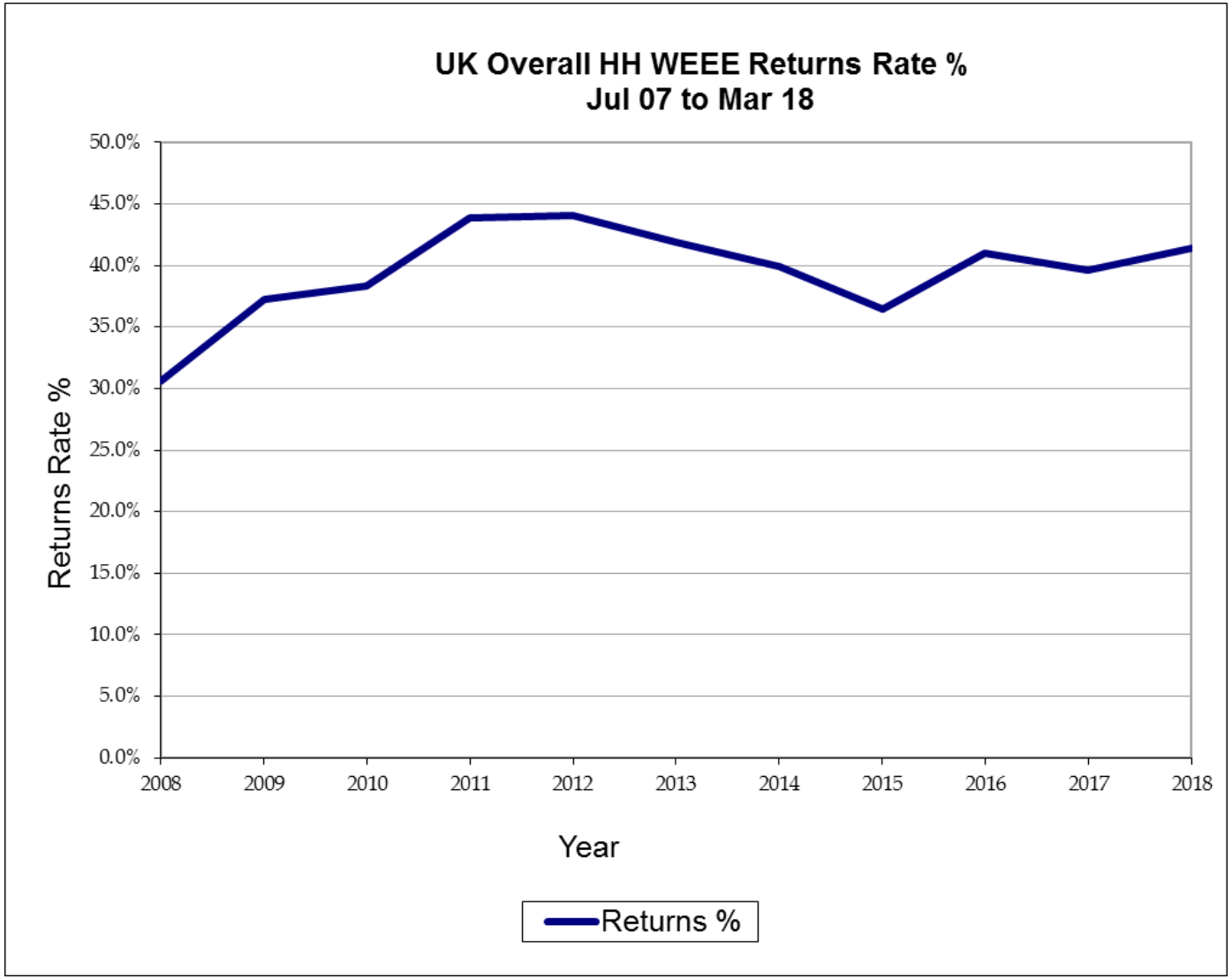
# Variation in return rates – display included

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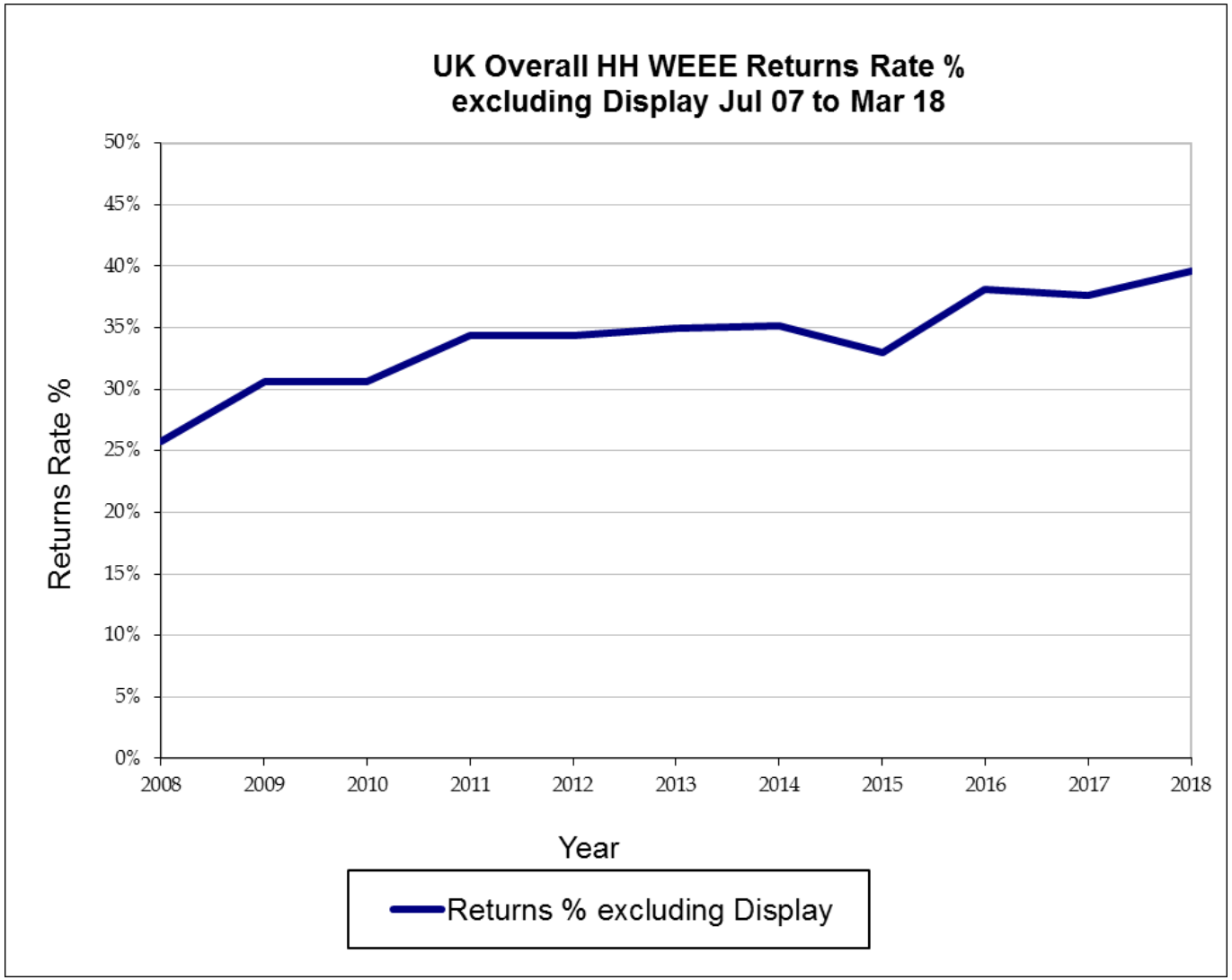
# Variation in return rates – without display

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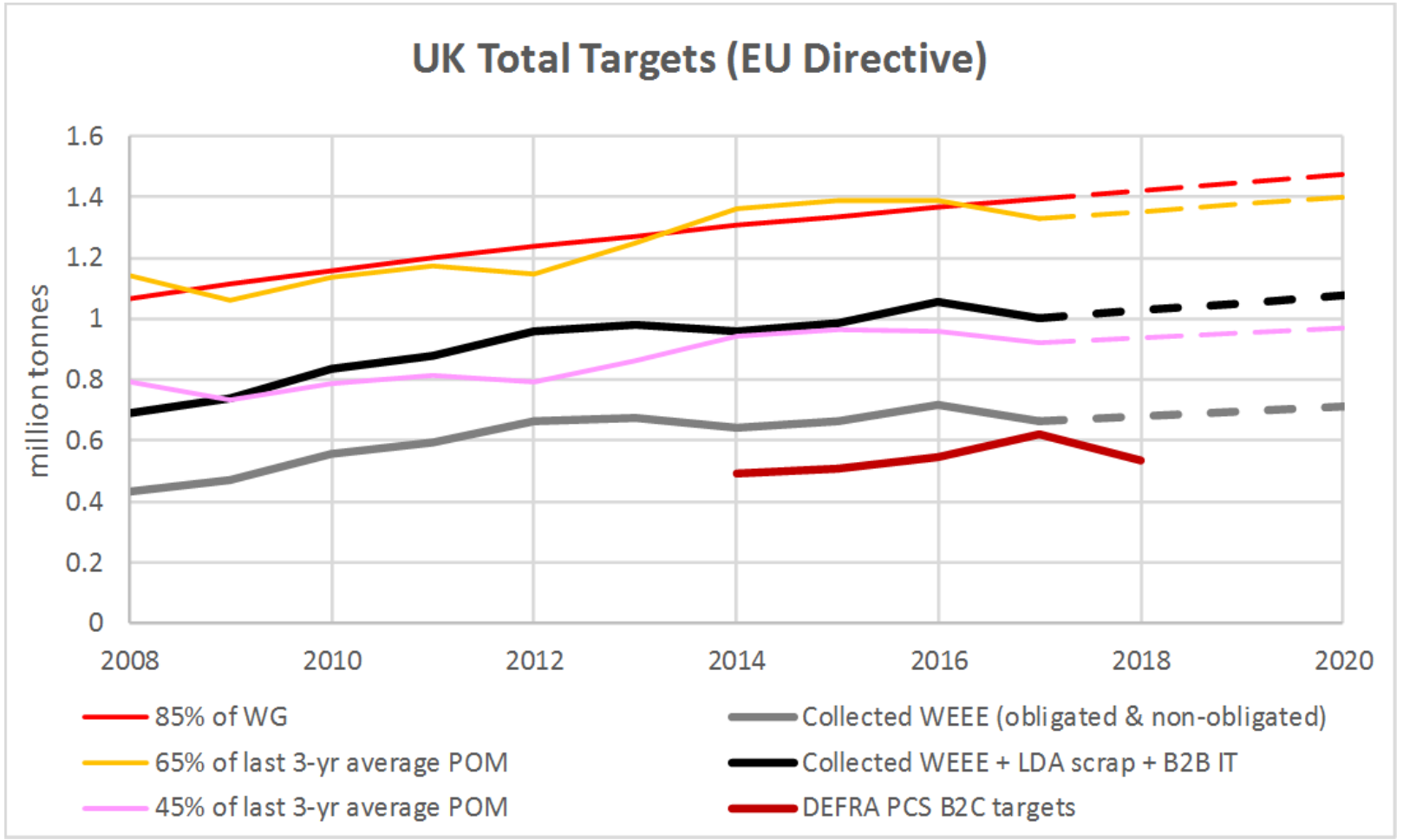
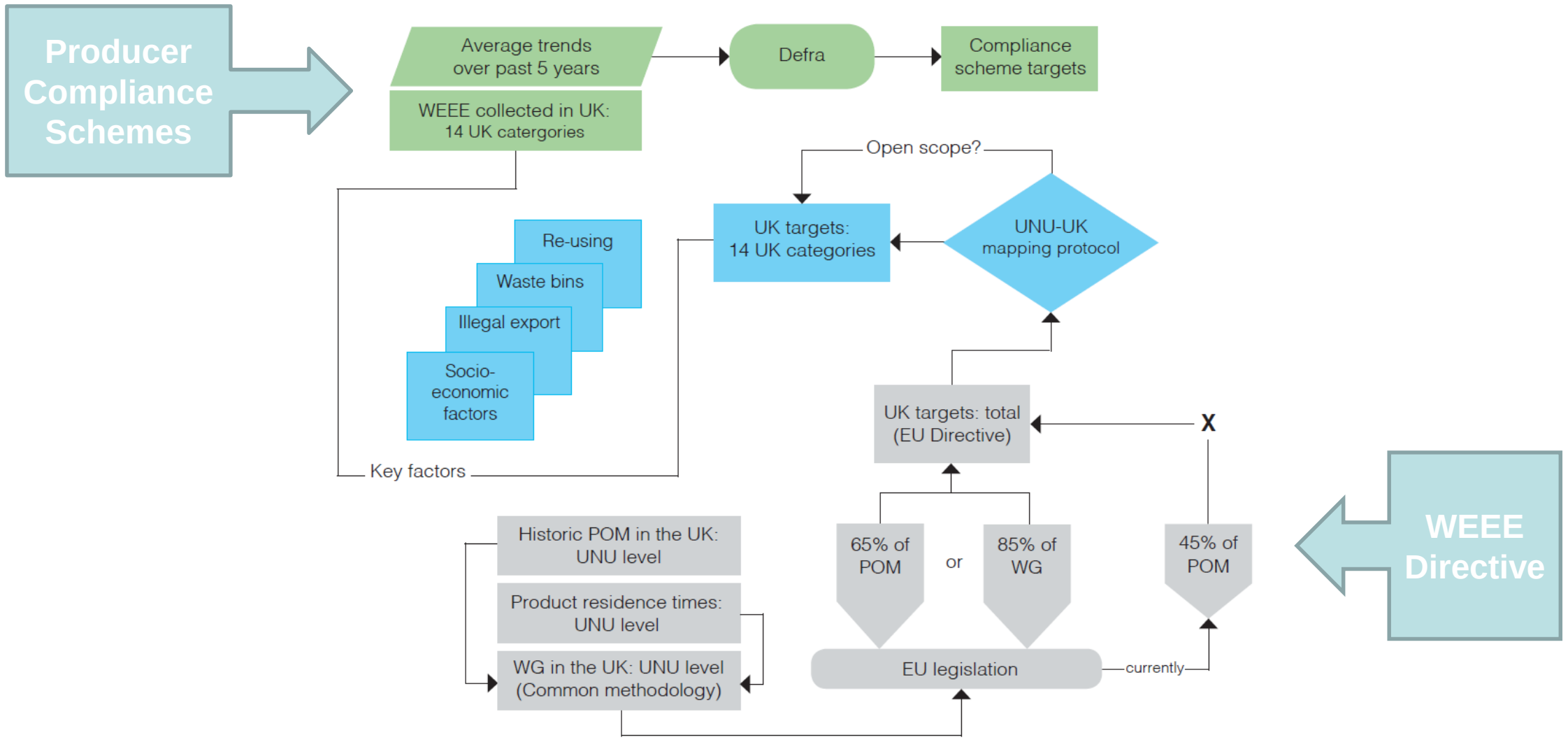
# Future Directive targets are challenging



# How targets are set



# New dynamic model for POM and WEEE

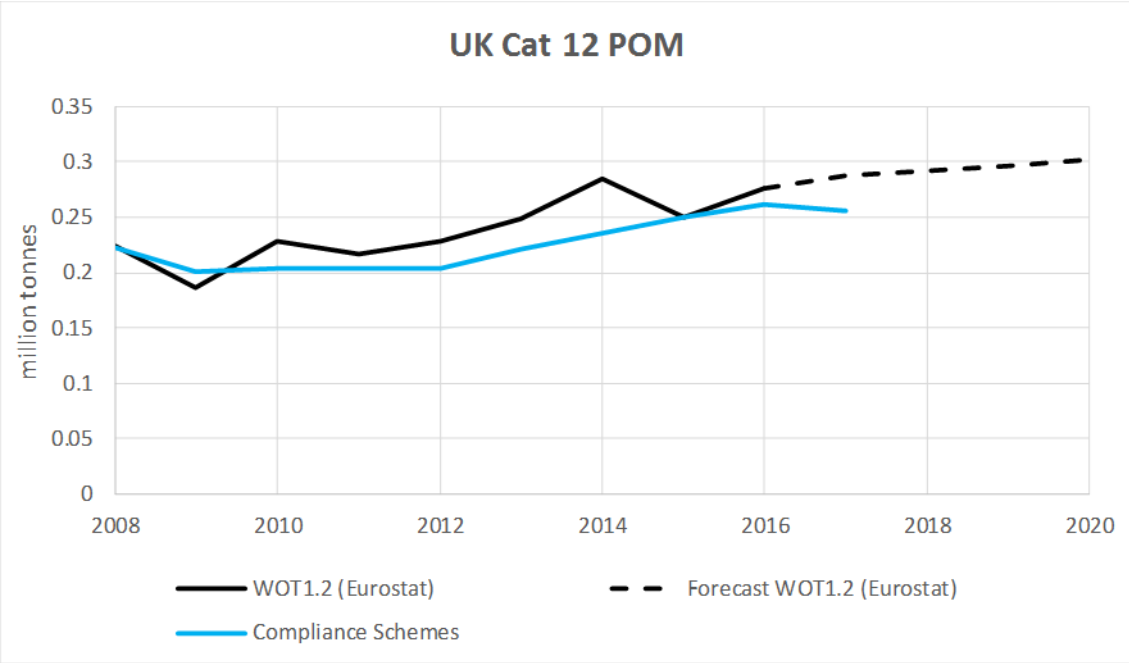
- Current models: POM estimated from the actual data; residence times distribution set at the moment $t'$ of sales and does not respond to market fluctuations:

$$W(t) = \sum_{t'=1980}^{t} P(t')\,\varphi\underbrace{\left(t - t', k(t'), \lambda(t')\right)}_{\text{Weibull distribution}}$$

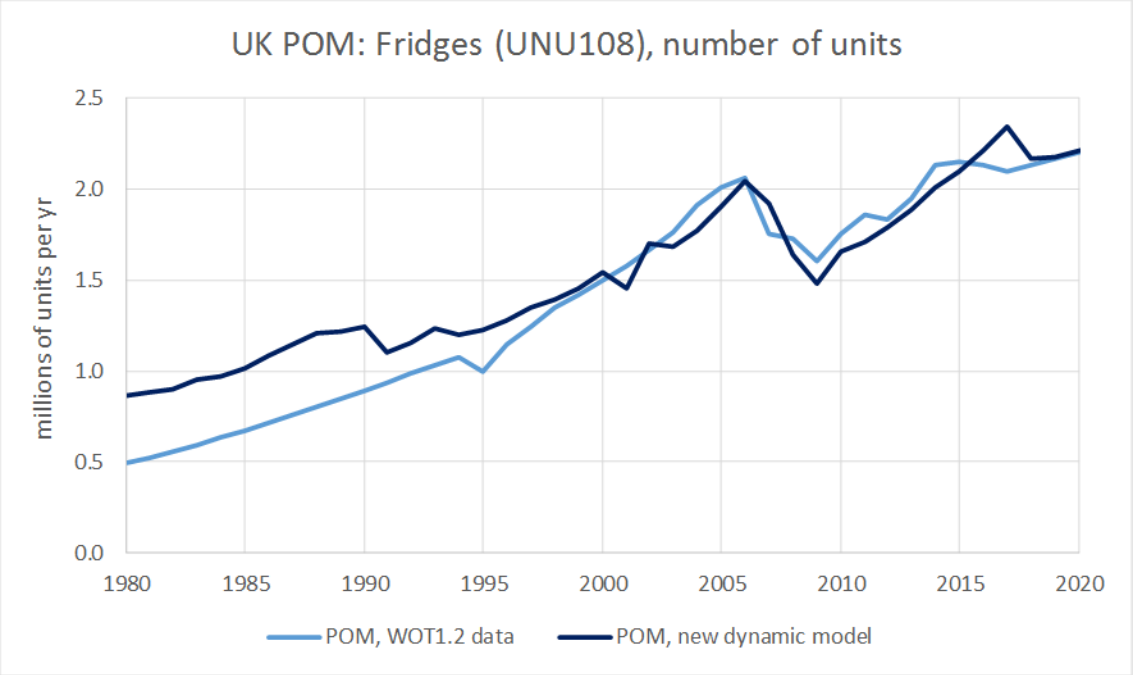
- New model: POM (**units per year**) consists of stock changes and replacement market. The latter produces WG. Residence times distribution responds to market fluctuations at the current time $t$:

$$P(t) = \underbrace{\frac{dS}{dt}}_{\text{Stock changes}} + \underbrace{W(t)}_{\text{Stock replacement = WG}}; \qquad W(t) = \sum_{t'=1980}^{t} P(t')\,\underbrace{\psi(t - t', t', t)}_{\textbf{Residence times distribution responding to market shifts}}$$

# WOT and WOT enhanced prototype outputs




## Cooling Category Placed on the Market

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# Dynamic factors in the new model

- Socio-economic
  - Inflation adjusted GDP per capita
  - Consumer Confidence Index
  - Inflation Indices
  - Number of households
  - Wealth distribution
  - Number of products in households and business
- EEE market
  - Inflation adjusted prices of given products
  - Market drivers affecting trends in sales
  - Trends in unit weight
- Mass balance and product residence time
- Unreported flows

# What does this mean for target setting?

- Improve data and intelligence through
  - Improved data with a higher confidence on other flows (complementary, unreported, reuse, second hand sales, substantiated, legal and illegal)
  - Better modelling of WEEE generated
  - Better understanding of the relationship between POM and WEEE generated including missing POM
  - Inclusion of more dynamic economic factors and impact on purchase and discard patterns
- Identify ‘available’ WEEE
- Tactical policy and target setting e.g. where they can have most effect
- Support planning and investment

# Find out more

Go to http://www.dynamicweeemodel.co.uk/ to view

- White Paper
- Voxpops
- Videos
- Updates