



Fresh Technologies

- Our objective is to develop technology (and protect it) to extend the shelf life of fresh produce and thereby reduce food waste, even in countries with poor chill chain
- We market in Europe, North & South America, South Africa, and India
- In order to provide flexibility and customer service, we have appointed manufacturing partners in each region.

Shelf Life Extension

- Different ways to achieve this objective eg spraying, dipping
- Our focus is on packaging improvement by enhancing or retarding the respiration of the produce

Potential Confusion of Terms

- Degradable
- Oxo-degradable
- Bio-degradable
- Compostable
 - Industrial
 - Home
- Bio-accumulation
- Renewable
- Sustainable
- Recycling
 - Industrial
 - Post Consumer
- Bio-plastics
- Petro-plastics

Compostable Packaging

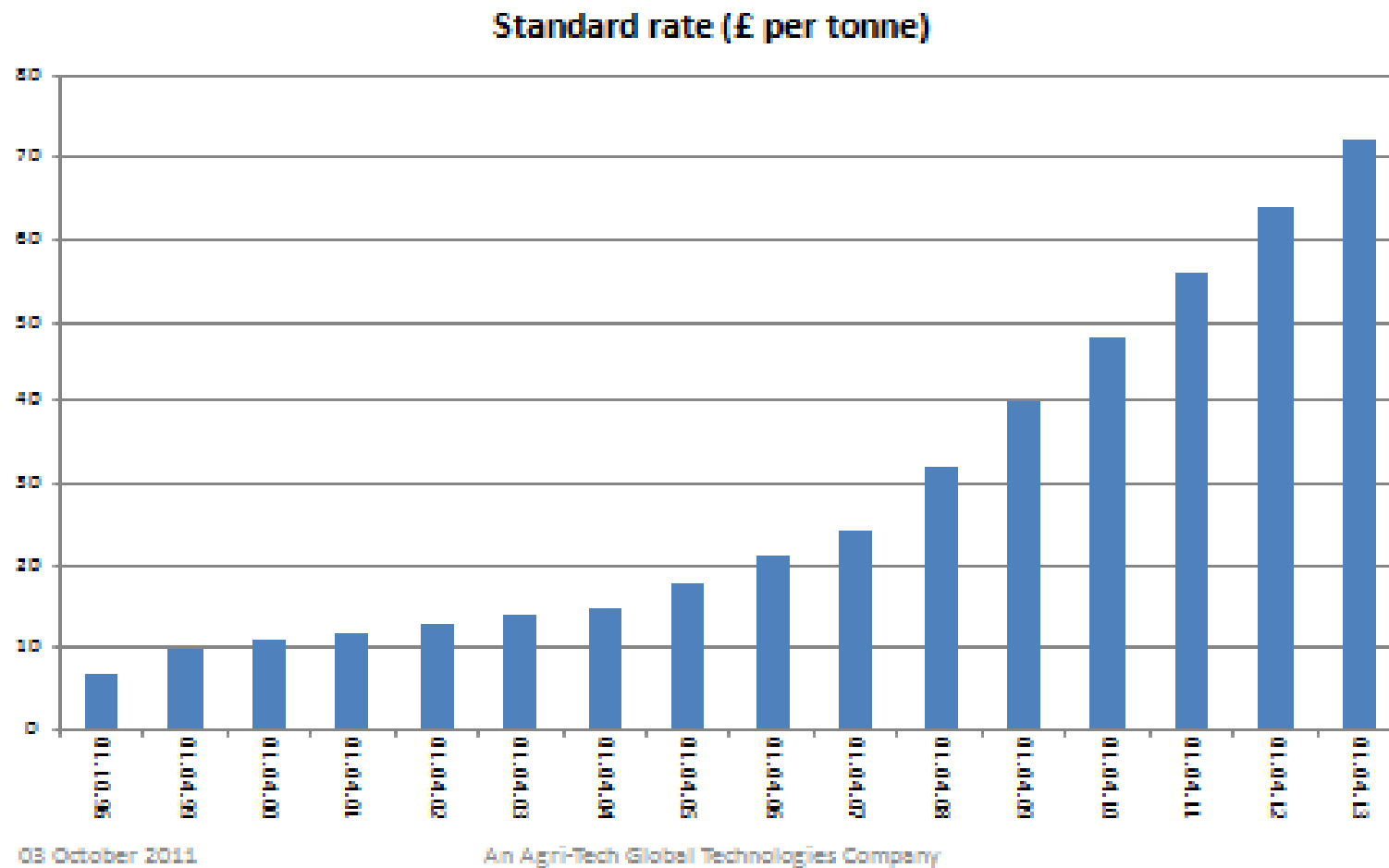
A complicated matter even without shelf life extension:

1. Supply concerns: Peak oil / Food crops
2. Marketing: Expensive
3. Collection: Segregation
Empty packaging (post consumer) – no food inside
Unopened packs (pre consumer) – food inside
4. Disposal: Composting facilities
Anaerobic digestion
5. **Cradle to grave policies essential**

Compost-Ready™

- Our compostable brand is Compost-Ready™
- All our compostable films are certified to comply with EN13432
- Fresh Technologies is ready to obtain DINCERTCO and/or OK COMPOST registration for specific Compost-Ready™ films or trays in partnership with the customer

Rates of Landfill Tax since introduction in October 1996



Bio-based plastics

🌱 Made from substances derived **totally** from living matter,

i.e. from a **sustainable and renewable** source





🌱 Often biodegradable:

e.g. PLA, Starch, cellulose,

but some petro-polymers now claiming to be renewable – made from sugar via ethanol so only partially renewable and not compostable:
Nylons & PET, PE & PP

🌱 Casein (from milk), Zein (from maize), Chitosan (from shells of shrimp and other sea crustaceans)

Compostable materials

-  Biodegrade using naturally occurring micro-organisms within a **specified time** period
-  Can be safely composted together with organic solid waste
(e.g. garden waste)
-  Do not affect the quality of the final compost.
-  Conform to EN13432 / ASTM D6400

Fate of Plastic Packaging Waste

Need to distinguish between

- Manufacturing Waste

and

- Post-Consumer Waste

Bottles
Trays
Film

Disposal Options

- **Incineration** :
Environmental concerns
High investment cost
- **Recycling** :
HDPE (eg Milk) and PET (eg Coca-Cola)
bottles only
- **Composting**:
Low investment cost
Key objective - driven by impossibility of
recycling films
Environmentally sound
Waste segregation problem
- **Landfill**:
Environmental concerns
Increasing landfill tax

Another disposal option for primary food packaging

NNFCC study has shown that compostable food packaging (certified compliant with EN13432) is suitable for treatment by an in-vessel composting or anaerobic digestion facility

Compostability

- European Norm EN13432
90% composted within 6 months
Defined process conditions (industrial)
Accreditation laboratories
- EN13432 does not seek to distinguish between oil-based petro-polymers and plant-based bio-polymers.
- Some polyolefins are compostable and contribute useful properties to compostable films

Home Compostability

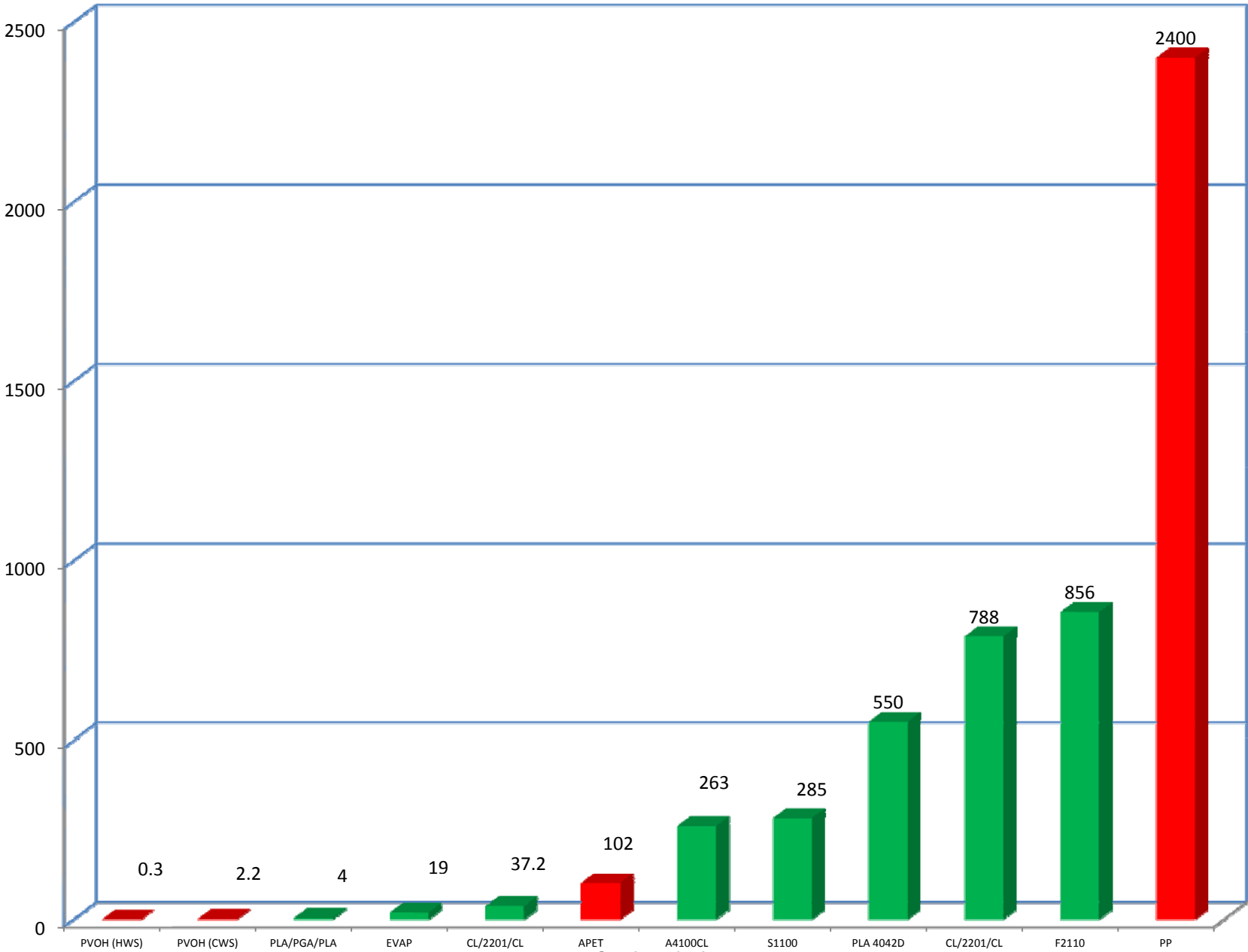
- No internationally or EU agreed standard for 'home compostable' packaging and plastics
- Test temperatures are lower & time period differs
- Efficiency of home composting will vary according to climatic conditions & what is composted



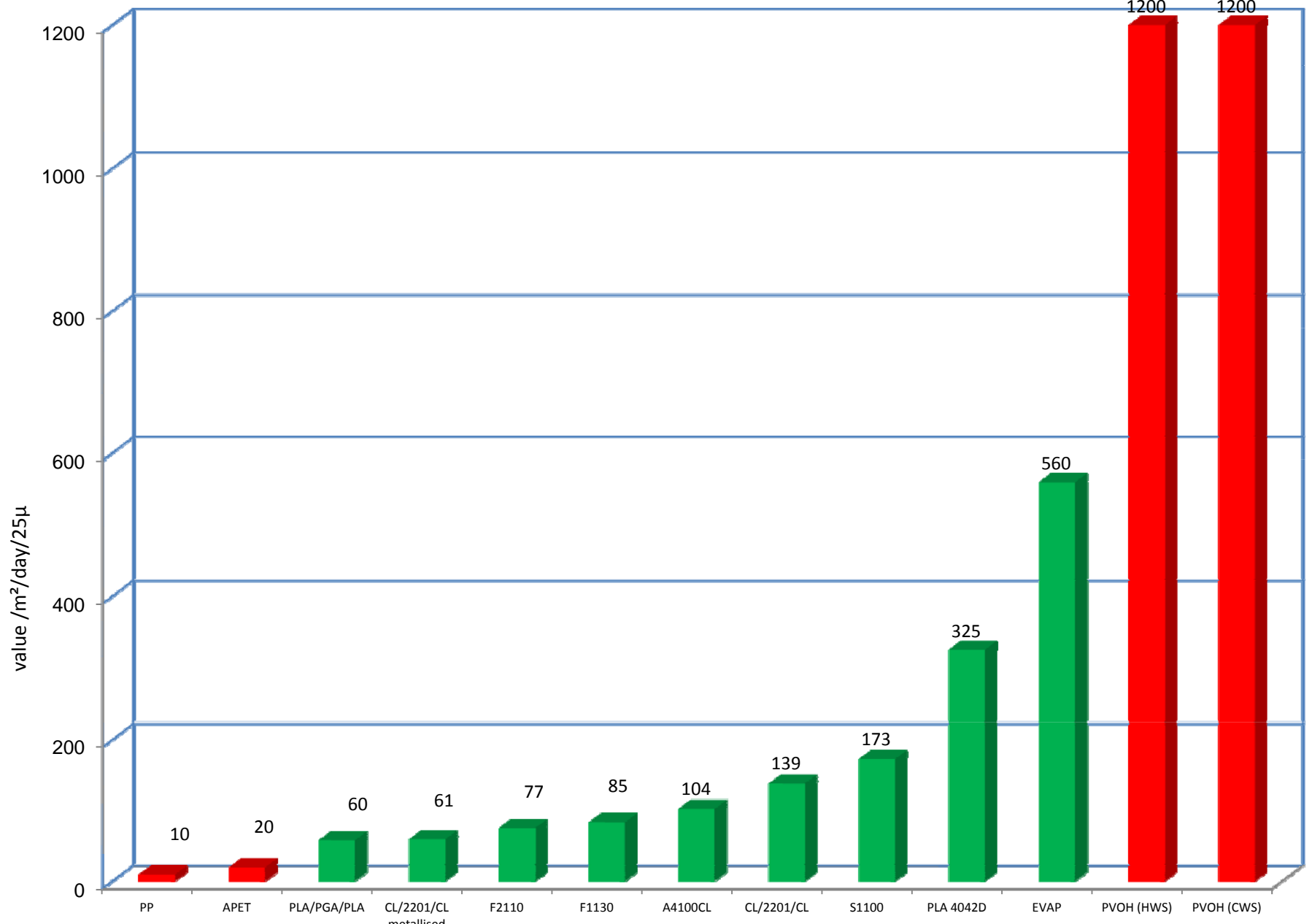
Mulch Film

- NFU 52001
Separate standard for agricultural use
Disintegration within the soil \neq Compostability
Issued by SERP BIO
Compost-Ready™ 1010 is already certified
- Ploughing in of oxo-degradable materials in UK has been banned by Environment Agency

Comparison of biopolymers - Oxygen transmission rate @ 23C 0% RH



Comparison of biopolymers - Moisture transmission rate @ 23C 100% RH



Conclusions

- Cradle to grave strategy is essential for development of compostable packaging
- Different strategies in each country according to political priorities
- UK behind the game