Department for Environment Food & Rural Affairs

Valuing ecosystem wealth

The UK case – projecting future services for ecosystem asset valuation

Expert meeting on ecosystem valuation

Bonn

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Rocky Harris

Defra, UK

Forestry Commission England | NATURAL ENGLAND | Environment Agency

Why do asset valuation?

- Because it's there!
- Because it's a commitment
  - Include natural assets within the nation's balance sheet
- Because it gives a big number (but not big enough!)
- Because it can tell us something different to the information about current flows
  - How are the flows expected to change?
  - How do the expected relativities between services or between value of ecosystem types change under different projections of service flows?
  - How do maintenance costs relate to the asset values?
- But it's still experimental …

Ecosystem asset valuation

- In the UK we have adopted the view that the NPV of future flow of services is the best way of estimating asset values
- Starting point for this presentation is asset values at a national or aggregate level; the approach can possibly be applied to country or regional level
- NPV requires a best estimate of the future or expected pattern of services flows (ideally in both volume and unit price terms) over a specified length of time
- Discounted with an appropriate discount rate
- Each calculation ideally requires consistent assumptions

    - For each service

    - For each type of asset

An appropriate discount rate over a specified number of years

- We opted for a Social Discount Rate of 3.5% (reducing to 3.0% after 30 years, 2.5% after 70 years)
- Flows are discounted over a 100 year asset life for renewable assets
- Reasons for this approach supported by a report by Freeman and Groom in 2016
  - Market rates are geared only to the relatively short term (10-20 years)
  - SDR is based on empirical evidence (Ramsey Rule) which incorporates an income growth element
  - Net of the income growth element (2% out of the 3.5%), the SDR is close to current market rates of 1.5%
  - Assumptions on asset lives for buildings and transport range from 60 to 100 years but beyond 100 years, additional years make little difference to the overall asset value: going beyond 100 years therefore adds uncertainty without a material change in value

Projections of services - factors to take into account

- The UN SEEA Technical Recommendations emphasise ecosystem condition as the key determinant of the future pattern of services

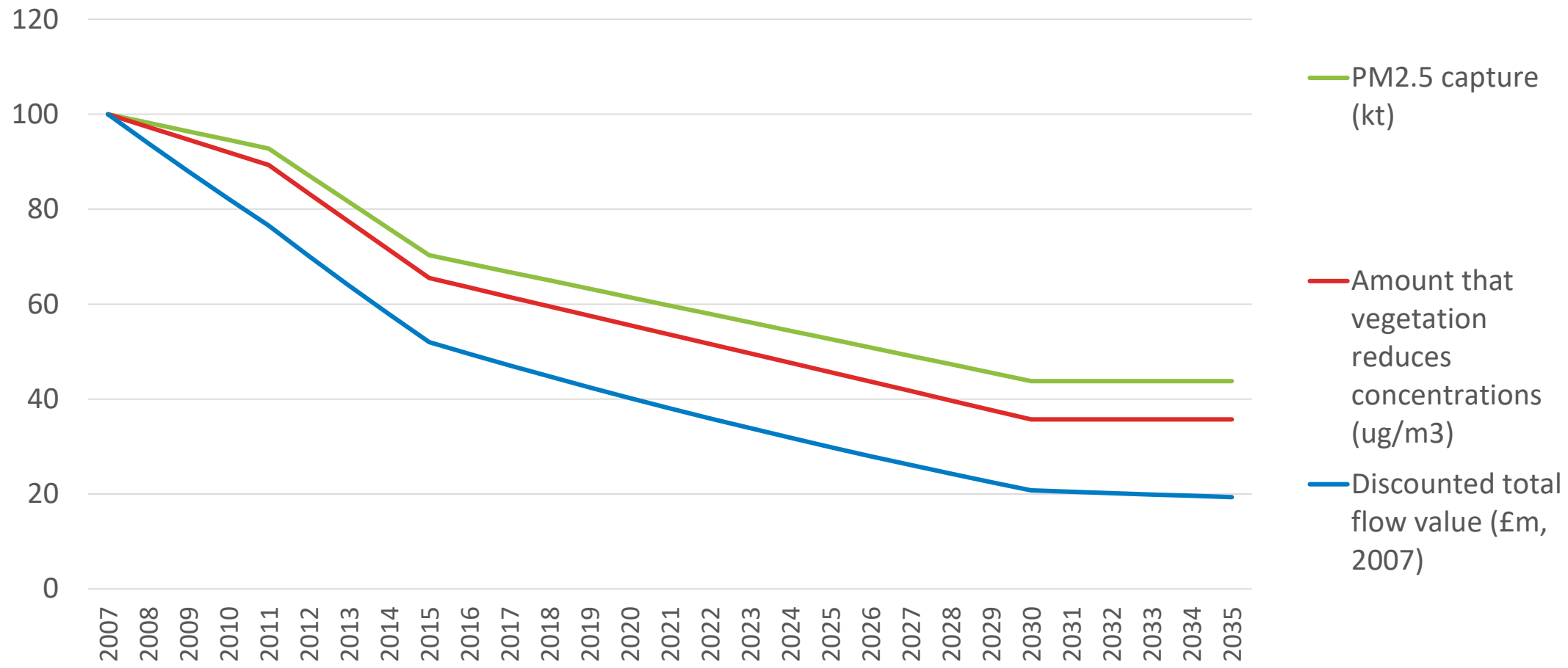
In practice we found it helpful to distinguish three broad determinants of future flow values (at national level):

- Factors which affect the supply of services in physical terms
  - E.g. Climate change, historic and current Government policies on tree-planting and felling, urban growth
- Factors which affect the demand for services in physical terms
  - E.g. Population growth, air pollution levels
- Factors which affect unit values
  - E.g. Income growth, future carbon prices required to meet Government targets

Why are these projections important?

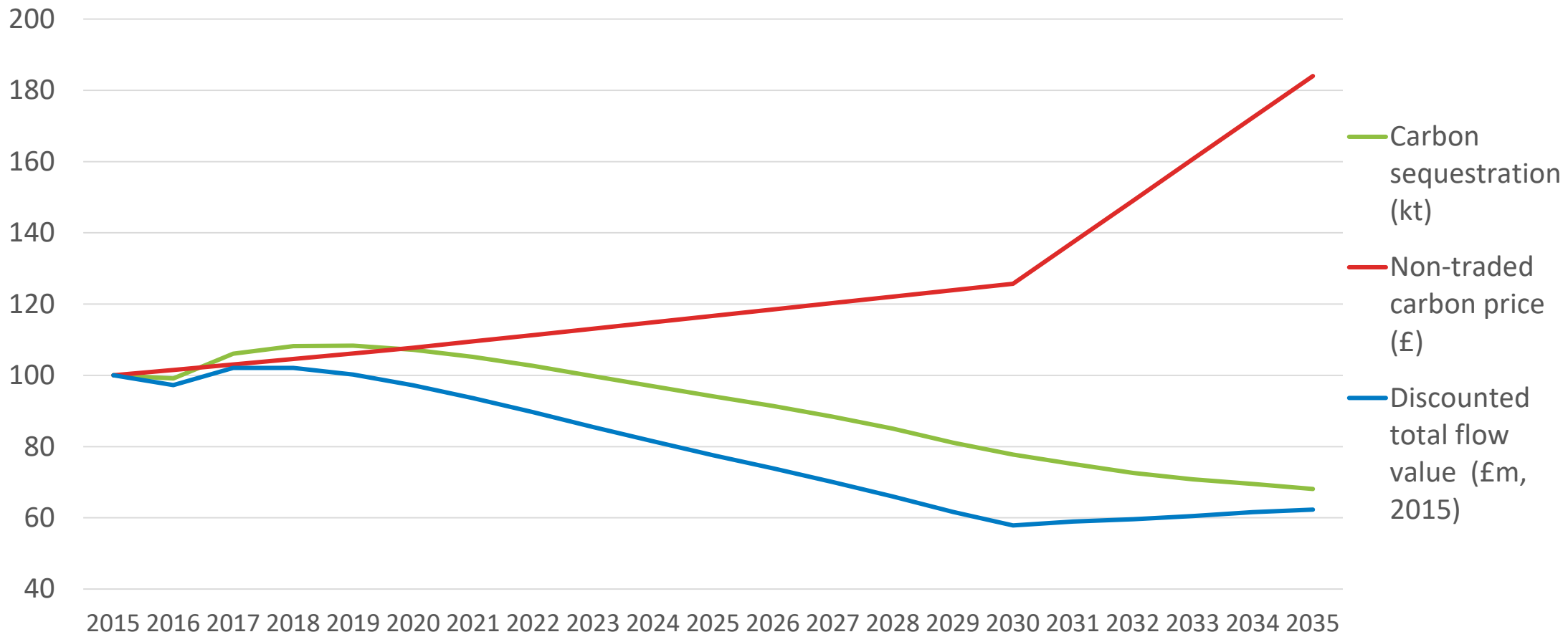
- Asset values only add meaning if they tell us something different to the assumption that current flows will continue indefinitely
- There are official projections of some factors which can readily be taken into account
  - E.g. carbon sequestration flows, population growth
- There are assumptions we can make about future demand which are consistent with the assumptions in the choice of discount rate
  - E.g. Income growth
- We can model some change on the basis that Government targets will be met – but this needs more care. Are they actually funded policies or actually backed up by enacted legislation?
  - E.g. PM2.5 emission reductions, future tree-planting levels

UK woodland air filtration projected service flows (2007=100)



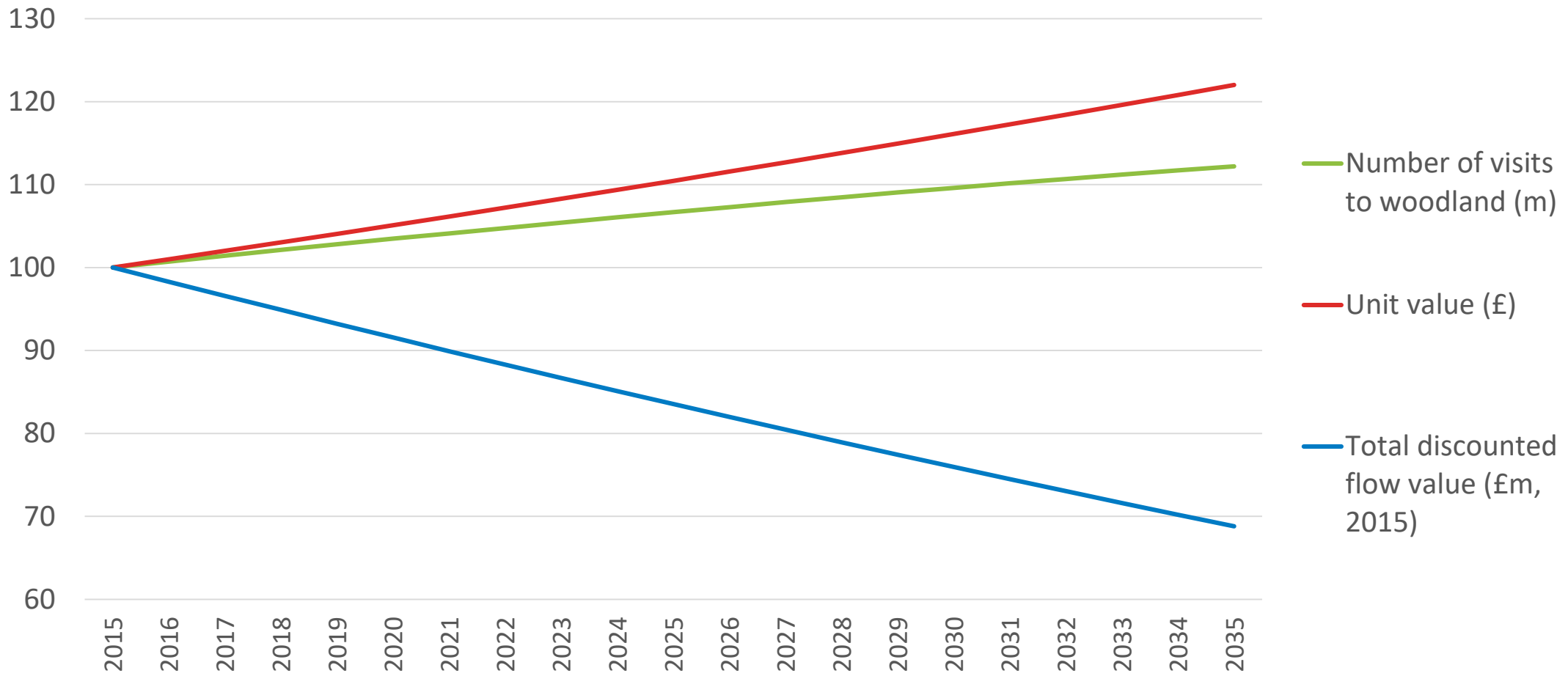
Supply side changes not modelled as they make little difference to projected flows: change is mainly driven by demand side factors and income growth offset by discount rate

UK woodland carbon sequestration projected flows (2015=100)



Carbon sequestration expected to reduce in medium term as planting last century matures; but carbon price will increase in order to meet climate change mitigation targets

UK woodland recreation projected service flows (2015=100)



Visits to woodland expected to increase in line with population growth; unit values will also increase with income growth, assuming 50% income elasticity

In summary, assumptions for UK woodland asset accounts

Service	Supply factors	Demand factors	Unit value factors
Air pollutant filtration	No change	Reduced emissions leading to reduced reductions in concentrations	Income growth
Carbon sequestration	Reduced tree growth		Non-market price increases
Recreation		Population growth	Income growth – income elasticity assumption

Asset valuation – issues we haven't tackled yet

1. **Future land cover/land use change.** If we expect woodland or urban areas to increase, what assumptions should we make about the location of these changes and the effect on other services (without setting up an all-singing all-dancing ecosystem scenario model)?
2. **Past evidence of real terms unit price increases.** If unit prices are consistently increasing in real terms (e.g. timber prices) over the last twenty years, it might be reasonable to assume they will continue to increase at the same rate in the short term but not over the next 100 years. What would be a reasonable default assumption for the longer term?
3. **Economic growth, average income growth and median income growth.** The income growth assumptions interact with population growth assumptions and there may also be distributional implications for the demand for ecosystem services which we need to recognise
4. **Future changes in condition**. So far on the supply side we've only projected changes in extent. Are there any key condition changes which we ought to be able to model?
5. **Sub-national estimates of asset values.** To what extent can such assumptions and projections reasonably be applied at more detailed spatial levels?

Does it make any difference?

Illustrative UK woodland asset values[1]

The effect of different assumptions at national level	USD billion 2015 prices
Recreation services - constant 2015 flows	15.2
As above, with allowance for population growth	17.4
As above, with allowance for 2% income growth and 50% income elasticity	24.3
Air filtration services – constant 2015 flows	29.2
As above, with projected emissions reductions to 2030	16.4
As above, with allowance for population growth	18.5
As above, with allowance for 2% income growth	35.5

1. Using Social discount rate, which embodies a 2% income growth assumption