

IA Calculator Supplementary information

User guide

1. The first step is to ensure the green table in the inputs tab is filled in correctly for each option and select the appropriate discount rate (the default of 3.5% should be used in most cases).
 - a. Appraisal period is the total length that the policy is expected to have costs and benefits for.
 - b. Price base year reflects the year that prices used to calculate costs and benefits are taken from. For instance, if a policy requires businesses to purchase a new machine every year and the price of a machine in 2018 is used then the price base year is 2018 and all other prices for this policy should be taken from 2018. The calculator will use GDP deflator figures to present figures in 2019 prices for input into the impact assessment template. This reflects adjustment for inflation. In the event of a fixed cost or benefit being entered (eg a fixed charge which doesn't increase with inflation) then a suitably deflated series should be entered to reflect the real cost over time.
 - c. Present Value base year reflects the year that costs or benefits commence for a policy option. By definition this must be after the current year. The calculator uses the discount rates set out in HMTs Green Book (3.5%) to discount figures to a 2020 present value for the impact assessment template. This reflects the social time preference value of money.
 - d. Throughout the current Parliament we will be using a price base year of 2019 and a present value year of 2020. This ensures that measures are compared like for like across the term of the Parliament. Any Impact Assessments which do not present final EANDCBs in these terms will be re-baselined to 2019 prices and 2020 present value prior to being included in the BIT report.

Inputs

1. Please enter below the length of the appraisal period (default is 10 years), the price base year for the costs/benefits you enter, and the year the costs/benefits begin for each option:

	Appraisal period in years	Price Base Year	Present Value Base Year (Year costs / benefits begin)
Option 1:	10	2019	2019
Option 2:	10	2019	2019
Option 3:	10	2018	2019
Option 4:	10	2017	2019
Option 5:	10	2016	2019
Option 6:	10	2015	2019

For the purposes of the BIT and wider reporting on better regulation, EANDCB, Business NPV and NPSV are to be presented in 2016 prices and discounted to 2017, in order for all policies to be compared using consistent pricing and discounting.

2. Please select the discount rate required from the drop down box below, the default 3.5% is taken from HMTs Green Book Annex 6. Explanation of where one may depart from this default can be found in 'Intergenerational wealth transfers and social discounting: Supplementary Green Book guidance'

Discount rate:

3.5%

2. For each option tab costs and benefits should be entered in millions, so £1,500,000 should be entered as 1.5. Please round final values for EANDCB to the nearest £0.1m.

- Each year should be the 12-month period from when the policy starts, so this may not fit with a calendar year. If a policy has costs and benefits starting in different years, please remember to stagger them when entering the figures into the calculator.
- An error message will appear if the drop-down boxes for business and direct business impact are not completed, please select yes or no for both boxes for each cost or benefit you enter. Note that a direct business impact must be a business impact.
- The + buttons in the margins can extend the number of years up to 50 and give the option for 5 different transition costs or benefits and 15 different annual costs or benefits.

1	2	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	2	Impact on Business?	Direct Impact on Business?	Option 5 Year	Description of cost or benefit	FIGURES SHOULD BE ENTERED IN £M FOR EACH 12 MONTH PERIOD (OR 'POLICY YEAR') FOLLOWING DATE COSTS / BENEFITS BEGIN										BC
3	4	YES/NO	YES/NO			1	2	3	4	5	6	7	8	9	10	
4				Transition Costs												Nominal To
5		YES	YES	Transition Cost 1 - Best Estimate		85.0	53.0	80.0	46.0	73.0	32.0	27.0	56.0	62.0	70.0	63
6				Low		97.0	93.0	84.0	12.0	56.0	21.0	60.0	41.0	13.0	65.0	56
7				High		36.0	99.0	51.0	17.0	93.0	41.0	83.0	69.0	64.0	82.0	72
8		YES	YES	Transition Cost 2 - Best Estimate		85.0	53.0	80.0	46.0	73.0	32.0	27.0	56.0	62.0	70.0	63
9				Low		97.0	93.0	84.0	12.0	56.0	21.0	60.0	41.0	13.0	65.0	56
10				High		36.0	99.0	51.0	17.0	93.0	41.0	83.0	69.0	64.0	82.0	72
11		YES	YES	Transition Cost 3 - Best Estimate		85.0	53.0	80.0	46.0	73.0	32.0	27.0	56.0	62.0	70.0	63
12				Low		97.0	93.0	84.0	12.0	56.0	21.0	60.0	41.0	13.0	65.0	56
13				High		36.0	99.0	51.0	17.0	93.0	41.0	83.0	69.0	64.0	82.0	72
14		YES	YES	Transition Cost 4 - Best Estimate		85.0	53.0	80.0	46.0	73.0	32.0	27.0	56.0	62.0	70.0	63
15				Low		97.0	93.0	84.0	12.0	56.0	21.0	60.0	41.0	13.0	65.0	56
16				High		36.0	99.0	51.0	17.0	93.0	41.0	83.0	69.0	64.0	82.0	72
17		YES	YES	Transition Cost 5 - Best Estimate		85.0	53.0	80.0	46.0	73.0	32.0	27.0	56.0	62.0	70.0	63
18				Low		97.0	93.0	84.0	12.0	56.0	21.0	60.0	41.0	13.0	65.0	56
19				High		36.0	99.0	51.0	17.0	93.0	41.0	83.0	69.0	64.0	82.0	72
20				Annual Costs												
21		YES	YES	Annual Cost 1 - Best Estimate		22.0	48.0	37.0	47.0	20.0	93.0	12.0	52.0	44.0	91.0	52
22				Low		22.0	48.0	37.0	47.0	20.0	93.0	12.0	52.0	44.0	91.0	52
23				High		22.0	48.0	37.0	47.0	20.0	93.0	12.0	52.0	44.0	91.0	52
24		YES	NO	Annual Cost 2 - Best Estimate		45.0	31.0	38.0	68.0	33.0	85.0	87.0	67.0	13.0	84.0	64
25				Low		45.0	31.0	38.0	68.0	33.0	85.0	87.0	67.0	13.0	84.0	64
26				High		45.0	31.0	38.0	68.0	33.0	85.0	87.0	67.0	13.0	84.0	64
27				Annual Cost 3 - Best Estimate												
28				Low												
29				High												
30				Annual Cost 4 - Best Estimate												
31				Low												
32				High												
33				Annual Cost 5 - Best Estimate												
34				Low												
35				High												
66																
67																
68																
69																
70				Transition Benefits												Nominal To
71		YES	YES	Transition Benefit 1 - Best Estimate		87.0	56.0	50.0	65.0	45.0	55.0	39.0	59.0	70.0	30.0	58
72				Low		18.0	34.0	13.0	37.0	25.0	42.0	23.0	32.0	34.0	23.0	29
73				High		95.0	74.0	55.0	89.0	65.0	78.0	67.0	64.0	91.0	47.0	76

- The overview sheet contains outputs relevant to the impact assessment, the grey box gives figures required for Business Impact Target reporting and these are in 2019 prices and 2020 present value as explained above.
- As a default, the figures not in the grey box are for information and are output in the price and present value base years that are specified in the instructions tab. This explains differences between the figures in the grey box. There is an option to have the figures output in 2019 Price Year and 2020 Present Value Year, simply select YES from the dropdown at the top of the overview sheet.

Concepts

- The concept of Present Value takes into account that a set sum of money is not as valuable to us at some point in the future as it would be today, reflecting in part time preference and in part an assumption that as the economy is expected to grow over time, the marginal utility of each additional pound diminishes in the future. Future costs and benefits therefore

must be discounted in order to be comparable with today's costs and benefits. The Net Present Social Value of a policy is the Present Value of Benefits minus the Present Value Costs, and so demonstrates the overall current monetary value of a policy option.

- The calculator also uses all the costs/benefits that have been assigned as impacts on business to compute the Business NPV, and the direct impacts on business to compute Equivalent Annual Net Direct Cost to Business (EANDCB) for each option, using an EANDCB calculator which is embedded in the spreadsheet. This is required for the BIT. The EANDCB only uses the direct impacts on business, but an IA will often also include indirect costs to business. Please select "YES" only for those impacts on business that are direct, not the indirect impacts on business.
- The present value of each cost and benefit, for each option, is computed by the calculator. The results are converted into the 'Overview' tab and split into transition, average annual and total costs/benefits as is required in the Impact Assessment.
- EANDCB formulae on following page.

EANDCB Formulae

Key

Present Value of Net Costs to Business	PVNCB
Time period	t
Discount rate	r
Annuity Rate	$a_{t,r}$
Equivalent Annual Net Cost to Business	EANDCB

One discount rate (Green Book - time period less than or equal 31)

$$\text{EANDCB} = \frac{\text{PVNCB}}{a_{t,r}}$$

Where $a_{t,r}$ is the annuity rate

$$a_{t,r} = \frac{1+r}{r} \left[1 - \frac{1}{(1+r)^t} \right]$$

Two or more discount rates - Let r_i denote the discount rate in year i.

$$\text{EANDCB} = \frac{\text{PVNCB}}{a_{t,r}}$$

Where $a_{t,r}$ is the annuity rate given by:

$$a_{t,r} = \sum_{j=0}^{t-1} \prod_{i=0}^j \left(\frac{1}{1+r_i} \right)$$

Worked Example:

Suppose a policy is appraised over 60 years ($t=60$).

Years 0-30 the discount rate applied would be 3.5%, so $r_i = 0.035$, for $0 \leq i \leq 30$

Years 31-59 the discount rate applied would be 3%, so $r_i = 0.03$, for $31 \leq i \leq 59$

Then the annuity rate would be computed as follows, using the formula above:

$$\begin{aligned} a_{t,r} &= \sum_{j=0}^{59} \prod_{i=0}^j \left(\frac{1}{1+r_i} \right) \\ &= 1 + \frac{1}{1+0.035} + \frac{1}{(1+0.035)^2} + \dots + \frac{1}{(1+0.035)^{30}} + \frac{1}{(1+0.035)^{30}} \cdot \frac{1}{(1+0.03)} \\ &\quad + \frac{1}{(1+0.035)^{30}} \cdot \frac{1}{(1+0.03)^2} + \dots + \frac{1}{(1+0.035)^{30}} \cdot \frac{1}{(1+0.03)^{29}} \\ &= 26.22847751 \end{aligned}$$