Improving Policy Appraisal with **Risk Opportunity Analysis**

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1. *The challenge: policy appraisal for green growth*

The prevailing policy appraisal tool in many countries, Cost Benefit Analysis (CBA), is best suited to situations of marginal change, narrow objectives, and quantifiable outcomes.

Yet the shift to a green economy is a *structural* issue, there are *diverse interests* and outcomes are *uncertain*. CBA's limitations include:

- overlooking critical dynamics which affect policy outcomes
- obscuring trade-offs between different interests by reducing them to one number
- providing a false sense of certainty

2. *An emerging solution: Risk Opportunity Analysis*

Risk Opportunity Analysis (ROA) is a complementary policy appraisal tool which seeks to address these limitations.

ROA is appropriate to use for issues relating to:

- structural change
- where there are important outcomes across a range of dimensions
- where outcomes are highly uncertain, which cannot be meaningfully quantified

A step-by-step **Implementation Guidance** has been created (see QR code below).

3. *The 3 analytical components of ROA*

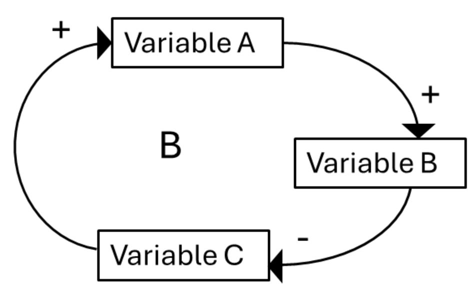
Step 1: Performance against dynamic processes of change

Assesses the effect of policies on processes of change (e.g. technology cost declines with cumulative deployment)

Why?

Policy appraisal should assess the likely effect of policy options on *processes of change* in a complex system, because cause and effect are often disproportionate (small inputs can lead to large outcomes and vice versa).

How? Systems mapping with Causal Loop Diagrams



Key steps: (i) identify important variables and give directions to relationships between variables (e.g. deployment decreases costs) (see right) (ii) map system and feedback loops (iii) determine feedback loop impact on policy interests (iv) identify policy option interactions with feedbacks (e.g. where they strengthen useful feedbacks).

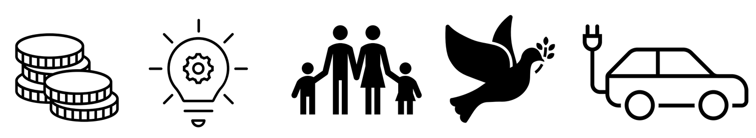
Step 2: Performance against multiple objectives

Assesses the effect of policies on multiple relevant outcomes (e.g. emissions, jobs, land use)

Why?

Policy appraisal should present information in a way which enables decision-makers to consider trade-offs between outcomes in different dimensions (e.g. lower energy cost at expense of energy security).

How? Identify outcomes that matter and find best available information



Key steps: (i) identify a set of outcome dimensions important to policy (e.g. renewable heat deployment, costs to government, cost of clean heating, jobs…) (ii) identify if the policy outcome is most concerned with expected most likely, best or worst case outcome (iii) for each category, assess expected, best or worst case outcomes of policy options in each dimension by drawing on best available information.

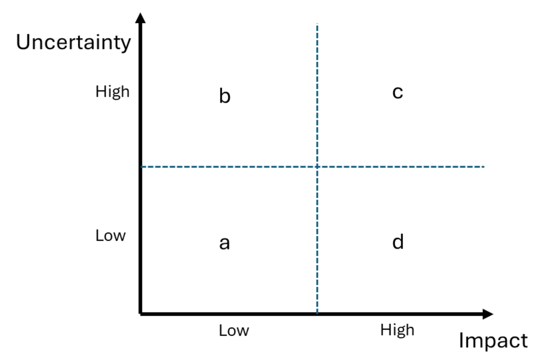
Step 3: Performance under uncertainty

Assesses if policy outcomes might be affected by factors out of the decision-maker's control (e.g. volatile fossil fuel prices, global shocks)

Why?

This step categorises each policy according to whether it is robust (performs well under all scenarios), resilient (is relatively easy to adapt as scenario uncertainties become clearer) or contingent (performs well only under certain futures), in key scenarios.

How? Scenario analysis



Key steps: (i) identify critical, high-impact uncertainties (using matrix above) (ii) cluster uncertainties and select scenarios; Develop key scenarios (iii) evaluate each policy, identifying if it is robust, resilient or contingent in each scenario (iv) identify how resilient policies can be adapted.

4. *Bringing analysis together and an illustrative example*

This component combines the most important findings from each of the 3 components into an easy-to read table, an 'ROA summary grid'. It shows key findings for an *illustrative* case study evaluating a hypothetical country's proposed subsidy to increase deployment of clean heating. Key findings include:

Step 1 (see coloured text)**:** Air Source Heat Pumps (ASHPs) perform well in the dynamic assessment, as there are helpful reinforcing feedbacks (including cost declines through deployment and innovation; and jobs increase deployment). Biogas creates an unhelpful feedback, as the use of the gas grid maintains fossil fuel infrastructure.

Step 2 (see colour shading)**:** Heat pumps also perform well in the multi-dimensional analysis, as they are cost effective to government, create jobs, diversify energy security, improve air quality and have no impact on land use. Biomass, combined heat and power (CHP) and biogas have mixed results.

Step 3 (see right hand column)**:** No policy options were entirely robust, but the subsidy for geothermal, heat pumps and biogas could be easily adapted to challenging scenarios. A subsidy for biomass and CHP is contingent, as it would only have been viable if biomass were not chosen globally as a key technology for decarbonisation, which would reduce supply.

This illustrative ROA concludes that using the subsidy to significantly increase deployment of heat pumps, rather than focusing on biomass-based solutions, most effectively achieves multiple policy objectives with fewer trade-offs.

Dimension	Renewable heat deployment	Costs to government	Cost of clean heating	Jobs	Energy security	Air quality	Land use	Decarbonisation of UK heating	Performance in relation to critical uncertainties
Geothermal	Capacity to produce 0.12TWh by 2020	Total: best estimate $10m Average annual: $0.5m Relatively cost-effective	Unknown	Limited, uncertain	Improves	No negative impact	Minimal	£6m over 24 years	**Resilient** Increase subsidy if oil & gas prices low
ASHPs	Capacity to produce 0.4TWh RH by 2020 **Highest learning-by-doing cost reduction feedback**	Total: best estimate -$600m Average annual -$15.7m Highly cost-effective **Helpful reinforcing feedback**	Can make cost of heating cheaper **Helpful reinforcing feedback**	High >70,000 by 2030 **Helpful reinforcing feedback**	Strongly diversifies energy security	Improves	No impact	£118m over 34 years	**Resilient** Increase subsidy if oil & gas prices low Build domestic supply chain if global focus on heat pump deployment
Biomass	Capacity to produce 0.3TWh by 2020	Total best estimate $150m Average annual $4m Highly cost effective	No impact	Limited, uncertain	Diversifies but increases risks	Potential negative	Risk of competition & negative effects	£38m over 34 years	**Contingent** (Only viable if biomass is not chosen as the main technology for heat decarbonization globally)
CHP	Positive, capacity uncertain	Best estimate $500m Average annual $17m	No impact	Limited, uncertain	Diversification but increases risks	Potential negative	Risk of competition & negative effects	£199m over 26 years	**Contingent** (Only viable if biomass is not chosen as the main technology for heat decarbonization globally)
Biogas	Positive, capacity uncertain	Uncertain	No impact	Limited, uncertain	Mixed evidence **Unhelpful reinforcing feedback: carbon lock-in**	Mixed evidence	Risk of competition & negative effects	Uncertain	**Resilient** Increase subsidy if oil & gas prices low

Simplified summary of findings from draft illustrative example.

Notes: Red and green text indicates conclusions from Step 1. The red, yellow, green and grey shading for each box indicates performance under Step 2, except for the last column, which is the synthesis of Step 3. Shading: green indicates a positive conclusion, yellow a mixed conclusion, red a negative conclusion, and grey a lack of data. Please note that the purpose of this illustrative case study is to demonstrate how ROA can be applied, not to analysis or advice.

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C3A s-curve economics

What we can offer:

- Discussion and workshops on the use of ROA with ministries of finance
- Support to test or implement ROA

Scan the QR code to read the draft ROA Implementation Guidance, and reach out to discuss next steps