

BTKNEEC, CBA, Excessive Cost, What Does the Future Hold ?

L. G. Pearson MSc, MCIWEM, DMS and B. J. Morrow IEng, AMICE, ACIWEM, Dip (WEM)
United Utilities, Service Delivery, Lingley Mere Business Park, Warrington,
WA5 3LP, UK.

1.0 Introduction

For the past 15 years there has been massive investment in environmental improvement, which has resulted in river water quality being better than at any time since the Industrial Revolution, and a high level of bathing water compliance. With the introduction of the Water Framework Directive (WFD), which will become the main driver for work in the coming years, there is an expectation of further incremental improvements. Over time it is becoming harder/more expensive to achieve further improvements and it is essential that there is a carefully thought out framework for investment decisions in place to ensure that schemes provide value for money, are affordable and sustainable.

Value for money, affordability and sustainability mean different things to different people. The decision making framework must therefore satisfy all possible stakeholders (The general public, OFWAT, Defra, the Environment Agency, Water Industry, Agriculture, Industry) each of which has differing objectives, which must be aligned in order to ensure successful implementation of the Directive. All the stakeholders must buy into and agree the process involved in making decisions.

There is already work underway to confirm the process of defining and assessing River Basin Districts and other elements of the WFD. However, there is a lack of definition/agreement in a number of key areas:-

- Best Technical Knowledge Not Entailing Excessive Cost (BTKNEEC)
- Cost Benefit Analysis (CBA)
- Excessive/disproportionate cost

These are all areas that need to be addressed before the Directive can be fully implemented. This paper sets out an approach developed by United Utilities (UU) during AMP3 to address these issues.

2.0 Background to Issues

With increasing environmental concern and limited financial resources the WFD clearly integrates economics into water management and policy making, in order to achieve environmental objectives in the most cost effective manner. It contains the requirement to carry out an economic analysis to support the selection of programmes of measures on the basis of cost effectiveness criteria and the potential need for derogations from the WFD's environmental objectives based on an assessment of costs and benefits.

The WFD requires that judgement be made regarding the most cost effective programme of measures that could be implemented to achieve its environmental objectives. In addition there is a requirement to assess whether programmes of work are disproportionately expensive. Whilst not specifically using the term, the WFD requires the application of BTKNEEC, in the same way that the Urban Wastewater Treatment Directive (UWWTD) requires that the design, construction and maintenance of collecting systems shall be undertaken in accordance with BTKNEEC.

The implementation of the WFD requires that the programme of measures proposed in River Basin Management Plans is assessed for cost effectiveness and disproportionate costs during the period 2006 to end 2008/2009. This will lead to a redefinition of work programmes and proposals for derogation from the WFD's objectives. The timing of this work should feed into the periodic review for AMP5.

With this requirement in place it is essential that the water industry in the UK, as a major WFD stakeholder and agent responsible for most of its delivery, plays a significant role in developing the thinking on excessive cost in terms of both its definition and calculation. This can also be set against a background of early work (Oxera, 1999), which concluded that the costs of the WFD could outweigh the benefits². This work also concluded that nationally the potential benefits are substantial and it can be expected that a large proportion of the benefits may be secured through locally effective and targeted implementation of the Directive and through the appropriate use of derogations where costs outweigh benefits.

3. What is BTKNEEC?

Best Technical Knowledge Not Entailing Excessive Cost can be summed up in one question "What is the right thing to do?" The application of the principles of BTKNEEC involves following a process of investigation and enquiry, which takes account of :

- Current environmental impact
- The current state of technical knowledge (modelling etc)
- The requirements of environmental protection
- The need to avoid excessive costs, having regard to the risk of significant environmental pollution

This final point is an area that requires further consideration in terms of defining and calculating excessive costs. This leads almost automatically into the application of cost benefit analysis (CBA), which is implicit within BTKNEEC. A further issue in interpreting 'excessive costs' is the relative importance of environmental cost benefit analysis versus the ability to 'afford' environmental improvements.

4. What is CBA?

Cost-benefit analysis (CBA) is an appraisal of the advantages and disadvantages of a proposal, valuing as many as possible of these in monetary terms. For items without a current market value i.e. those that cannot be bought or sold, two methods of valuation can be used: revealed preferences which use current transactions to help estimate how much people value things, such as the amount of money someone is willing to pay to travel to a site; and stated preferences (contingent valuation e.g. non use), where hypothetical questions, such as how much are you willing to pay for a particular effect, are put to people.

In assigning monetary values to benefits and dis-benefits associated with recreation etc, CBA is aiming to determine whether an investment is worthwhile from a social perspective. It therefore extends beyond a financial analysis to an economic analysis taking into account society's preferences and willingness to pay.

CBA aims to be comprehensive, by taking into account all advantages and disadvantages; transparent, since it requires the listing of all the relevant effects of a proposal, even if monetary value is not placed on all of them, which are then made clear to others; and enables decisions to be taken consistently. It is an aid to decision making, not a substitute for judgement. Wrong answers are more likely to result if cost-benefit analyses are not performed. It is possible to be intensely creative in generating solutions to a problem, and rigorous in the selection of the best one available. This solution may still not be worth implementing, as you may invest a lot of time and money in solving a problem that is not worthy of this effort.

CBA is implicit in BTKNEEC. The Environment Agency (EA) is required to take into account the likely costs and benefits in the exercise of its power. The EA produced its Benefit Assessment Guide (BAG))¹to evaluate the environmental and social costs and benefits of schemes proposed for the periodic review 2004 (PR04). This was developed specifically to assess continuous discharges. It is based on cost benefit analysis, expressing positive and negative impacts in monetary terms. The benefits include both use values (e.g. increased recreation) and non use values (e.g. peoples willingness to pay) for environmental improvement generally.

However, BAG, in common with other CBA methodologies has its problems (UKWIR 2004)³. Firstly there are a limited number of studies available from which to draw "willingness to pay" information, and therefore benefits transfer is applied. This means that the "willingness to pay" from one study area is applied to calculate benefits elsewhere. This is not necessarily reliable. Secondly the distance decay effects are very subjective. These problems place questions over the results that the process produces, with the potential for significant over-estimation of benefits.

5. What is Excessive/Disproportionate Cost?

In order to adequately apply the principles of BTKNEEC it is necessary to define excessive/disproportionate cost and also to apply it in a consistent fashion. For the purposes of the WFD a decision on disproportionate costs is to be decided by individual member states, the Directive does not provide a definition.

Inevitably the first step in assessing whether a cost is excessive will be the application of CBA, however, due to the uncertainty that is likely to characterize estimates of both costs and benefits in the lead up to WFD, disproportionality should not begin at the point measured costs simply exceed benefits. It would be more appropriate to consider the application of applying a multiplier to allow a cost benefit ratio in excess of 1. It may also be appropriate to take account of the ability to pay of those affected by the measures (RPA, 2004)

This type of approach reflects OFWAT's current thinking and is in line with the methodology applied by UU.

6. BTKNEEC Methodology

Whilst looking forward to the WFD, it is important to acknowledge that BTKNEEC is a requirement of the UWWTD and as such must be considered when progressing current programmes of work. Experience has shown that putting a framework to the consideration of BTKNEEC provides significant benefits to the decision making process at both a Programme and Project level.

The list of discharges which made up the Unsatisfactory Intermittent Discharge (UID) component of UU's AMP3 programme were in the form of a spreadsheet which specified a "*driver*" for each identified discharge and also identified the "*qualifying criteria*" which led to that UID being selected for inclusion. This spreadsheet did not specify what work had to be carried out in relation to the individual discharge and did not contain any cost information.

UU prepared an overall cost estimate for the programme, based on generic cost estimates based on experience in the AMP2 programme. The works could only be scoped following detailed investigations during the AMP3 programme and cost could only be estimated with confidence once individual detailed scopes of work had been settled.

It was understood by both UU and the EA that there was a need to undertake detailed investigation in order to confirm the need for work and the scope of solutions. These investigations were progressed by UU using the Urban Pollution Management (UPM) methodology, with study scopes being agreed with the EA. However, in addition to this, with a view to ensuring that solutions were being developed in line with BTKNEEC, UU developed a framework of enquiry to develop proposals that UU considered to be "the right thing to do". A flowchart detailing this methodology is shown in Figure 1, which was used to produce a proforma for use in the BTKNEEC assessment.

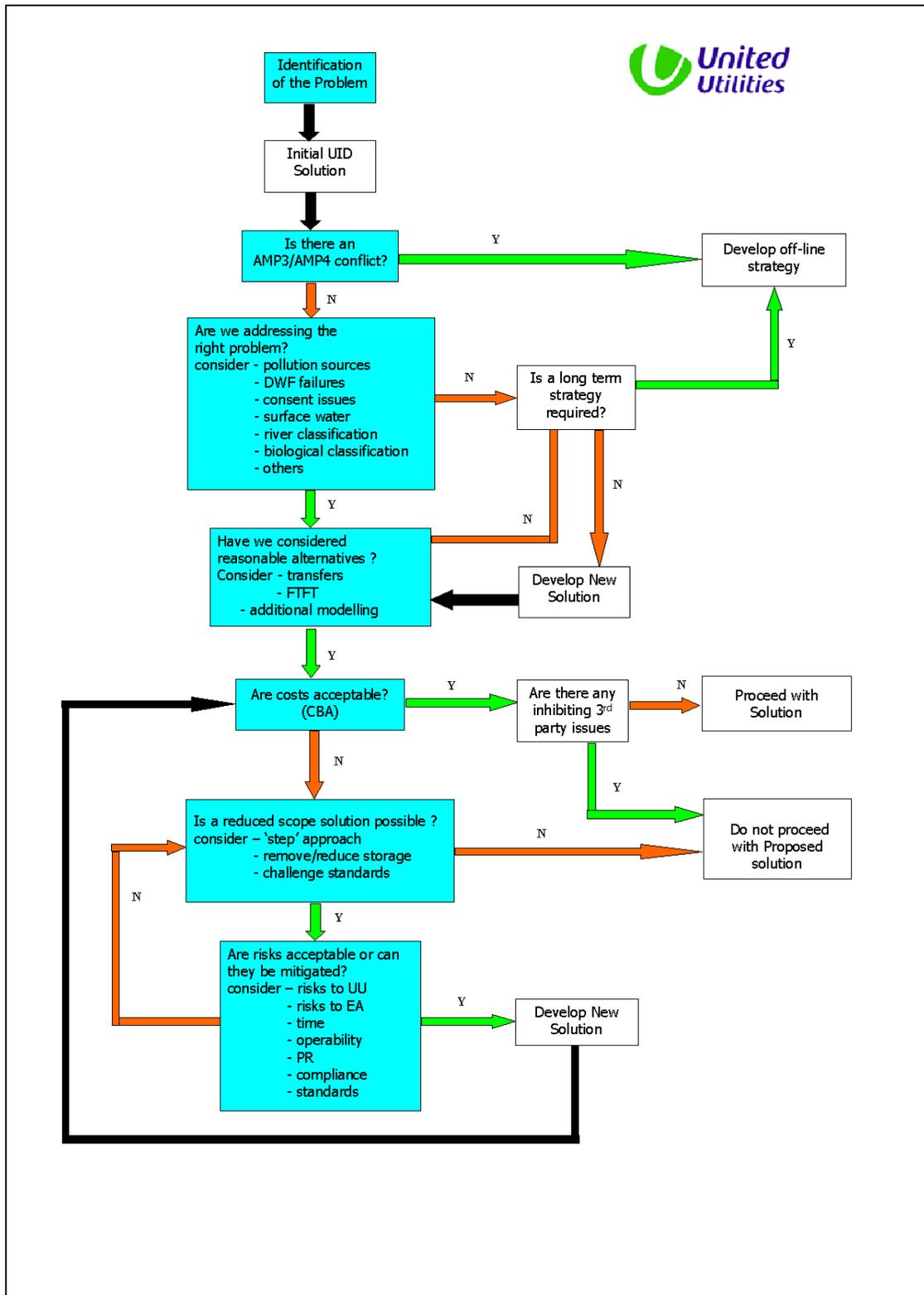


Figure 1 : BTKNEEC Flowchart

The main questions that this methodology addressed were :

a) Identification of the problem – This involved progressing the UPM methodology to assess need, and develop solutions to tackle that need. At needs stage this also involved a review in conjunction with the EA of intermittent discharges requiring attention.

b) Are we addressing the right problem? – This required consideration of the current reported river quality and all pollution sources to the receiving watercourse (network overflows, WwTW's, trade effluents, diffuse inputs etc), dry weather failures of the required standard, the effect of surface water runoff. The aim was to ensure that investment in improving the intermittent discharges would have the desired effect. A significant part of this assessment was a review of the EA's published chemical and biological General Quality Assessment (GQA) and River Quality Objective (RQO) data. This source of data was considered to be relevant to this assessment as it is public domain information and for the public is the only source of data by which they can judge that they are obtaining a benefit and value for money from the capital investment that they fund. Secondly the EA's BAG is also based around compliance with RQO. Finally, this data was also used in considering whether intermittent discharges should be designated as unsatisfactory in the first place.

c) Have we considered reasonable alternatives? – This question provided a check on the optioneering process to ensure that all potential solutions had been considered and that no potentially more cost effective answers had been missed such as relocation of discharge points and increases in Pass Forward Flow and Flow To Full Treatment at WwTW's.

d) Are the costs acceptable? - Having considered BTK with the previous questions, it was now appropriate to assess NEEC. This was where CBA came into play. UU applied the BAG methodology to calculate benefit values for the river reaches into which UID's discharged and compared these to the costs of installing solutions.

e) Is a reduced scope solution acceptable? – If at this stage in the process the solution was considered to be inappropriate for any reasons (need not proven, costs shown to be excessive etc.), it was appropriate to consider the provision of a reduced scope. For example should the monitored river quality data not support the provision of storage indicated by the UPM methodology, it may have been sensible to reduce the volume of storage or remove it all together.

f) Are the risks of a reduced scope acceptable or can they be mitigated? – If a reduced scope was to be considered, it was essential that risks were at an acceptable level. For example if the monitored data demonstrated compliance with a river's RQO, was the record of compliance long enough that this condition would be likely to continue into the future, or had there been other recent improvements that would maintain the record of compliance?

Further issues that also needed to be considered were links to other projects and future changes to standards, that may dictate the need for a wider strategy and which may lead to delays in the delivery of objectives or increase the costs to be compared to benefits.

This process generated an outcome for each output in the programme. These fell into the following categories.

- A. EA identified aesthetic problem - CBA does not support solution
- B. River reach meets RQO & biology complies – River impact solution is not required. Provide screen only
- C. River reach meets RQO & biology fails to comply – Full UPM solution is not justified. Provide upgrade to Formula A (if shortfall) and screen, or screen only
- D. River fails to meet RQO – Provide full river impact solution and screen
- E. River fails to meet RQO and CBA does not support full river impact solution – Provide upgrade to Formula A (if shortfall) or lower spill frequency and screen
- F. Bathing Water / Shellfish Water comply – carryout coastal modelling to prove/disprove impact of UID's
- G. River reach is unclassified therefore no monitoring data available, assume the river fails to meet its RQO and the biology is poor – Provide full 99%ile solution

It can be seen that CBA is mentioned in only 2 of the above scenarios, this is because CBA informs the decision making process, but it did not by itself make decisions. The outcome of this analysis was used to put a proposal to the EA on a case by case basis and discussions on some of these are ongoing.

7. Conclusion

As previously stated the aim of the WFD is not only to achieve environmental improvements, but also to deliver these improvements in the most cost effective manner, providing benefits to society which are clearly demonstrated to be value for money and are affordable. There are a number of key elements that require definitions and agreed methodologies for the successful delivery of the Directive's objectives :-

BTKNEEC

CBA

Excessive/disproportionate cost

This paper outlines one approach developed and applied by UU, which could form the basis of a methodology to satisfy WFD. However, it is reliant upon the currently available techniques for assessing benefits. The Water Industry has been addressing all of the issues discussed in this paper in one form or another for a long time, and for the future it is possible to hold a good degree of confidence that programmes of work will be developed in line with BTK. However, the ability to adequately assess NEEC is currently in question. The EA's BAG has its pitfalls and will require significant development for it to satisfy the requirements of the WFD.

Fundamental to all of these issues is a definition of "excessive/disproportionate" cost, as it is the ultimate measure of value for money and it is against this that decisions regarding derogations will be made. It is essential that this issue is further explored in order that a consensus can be achieved between all stakeholders across industry, regulators and the general public.

Some of these issues may be more difficult to resolve than others, but the one thing that they all have in common is that they must be agreed by all stakeholders before the work starts in earnest. Therefore, time is the most important item.

The Water Industry has a unique opportunity with the WFD to utilise its vast experience, knowledge and technical expertise in the planning and delivery of the objectives of the Directive.

8. References

1. RPA (2004): CEA and Developing a Methodology for Assessing Disproportionate Costs, Final Report for Defra, WAG, SE and DOENI, July 2004.
2. OXERA (1999): Potential Costs and Benefits of Implementing the Proposed Water Resources Framework Directive, Final Report to DETR, 1999.
3. UKWIR (2004) : Environmental Benefit Assessment, Report Ref.No. 04/EQ/01/1.