Licensing hydro electricity schemes in Scotland: the role of environmental economics in regulatory decision making

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1. Introduction – economics and regulation

The Scottish Environment Protection Agency (SEPA) is Scotland's environment regulator and our main role is to protect and improve the environment. We do this in a number of ways, for example by acting as an adviser to government and industry, by being an exemplar and by monitoring the condition of the environment. However our main role is environmental regulation which involves the application of rules to control behaviour that has an impact on the environment and this paper will focus on SEPA's duties as a regulator. SEPA has identified a number of principles according to which it will fulfil it's regulatory duties[1]. These principles operate at three different levels and are summarised in Table 1.

Table 1: SEPA's principles of regulation

High level	Process level	Authorisation level
Sustainable development Precautionary principle Sound science/information Integrated environmental protection Polluter pays Efficiency and effectiveness Environmental protection and improvement	Proportionality Fairness, consistency, legally correct Transparency/accountability	Reasonable Achievable

These principles well illustrate the role of environmental economics in environmental regulation. At a high level, for example, the sustainable development principle requires that economic, social and environmental impacts of regulatory decisions are taken into account, and integrated environmental protection requires that impacts on different environmental media are taken into account and balanced in making decisions. At a process level SEPA is required to recover the costs associated with its regulatory activities so it is vital that decision making processes are proportionate and more time is not spent making individual decisions that the final environmental impacts would warrant. Decision making processes also need to treat different operators fairly and, as far as possible, apply in a similar manner across different regimes. All processes also need to be transparent so that those who are affected by them are able to understand the way that decisions are taken.

Although there are clear roles for environmental economists in implementing SEPA's regulatory principles, less than three FTE (full time equivalent) environmental economists work for SEPA. It is therefore essential that decision making processes that are based in economics theory can be applied and understood by SEPA's regulatory staff, who are not economists.

2. The EU Water Framework Directive

[1] SEPA (2005), SEPA's vision for regulation, www.sepa.org.uk.

To illustrate the way in which SEPA's principles of regulation are applied in practice, this paper focuses on the EU Water Framework Directive (WFD)[2]. SEPA implements the WFD in Scotland through the Water Environment (Controlled Activities) (Scotland) Regulations 2005, also known as the Controlled Activities Regulations, or CAR. The WFD sets out criteria for high, good, moderate, poor and bad 'ecological status', and requires that the status of all water bodies is maintained and/or improved to 'good'. However, some activities that cause an adverse impact on the water environment can serve beneficial purposes, for example, public water supply, flood defence and hydro electricity generation. Article 4(7) of the WFD therefore allows certain new modifications to the water environment which cause the status to deteriorate but only if (amongst other things):

> *….."the benefits to the environment and to society of [maintaining good ecological status] are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development.."*

Essentially regulatory decisions about whether or not to license activities which damage the water environment require a cost benefit assessment of the new activity to be undertaken. This cost benefit assessment should take account of the full range of impacts associated with a new activity so that decisions about the net impact on social welfare can be made. This interpretation of the requirements of Article 4(7) essentially means that only activities that are cost beneficial will be licensed. However, as stated previously, in the vast majority of cases these 'cost benefit' decisions are taken by non-economists and they need to be taken in way that is transparent, consistent, proportionate and straightforward for non-economists to implement.

SEPA has developed a regulatory method (WAT-RM-34[3]) and supporting guidance (WAT-SG-67[4]) which requires a comprehensive range of positive and negative impacts associated with new developments to be taken into account. This enables clear and consistent decisions about the net contribution of new developments to human health, human safety or sustainable development to be made. Whenever SEPA receives a licence application for a new activity that causes an adverse impact in the water environment the WAT-RM-34 method has to be applied.

Essentially WAT-RM-34 and WAT-SG-67 set down a comprehensive list of impacts that, if significant, need to be taken into account in making these licensing decisions. The impact areas that need to be taken into account were developed following studies of the impacts that are taking into account in environmental, economic and social impact assessment[5] and are shown in Table 2.

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[2] http://ec.europa.eu/environment/water/water-framework/index_en.html

[3] SEPA (2009), Regulatory Method (WAT-RM-34), Derogation Determination – Adverse Impacts on the Water Environment.
http://www.sepa.org.uk/water/water_regulation/guidance/all-regimes.aspx

[4] SEPA (2009), Supporting Guidance (WAT-SG-67), Assessing the Significance of Impacts – Social, Economic, Environmental.
http://www.sepa.org.uk/water/water_regulation/guidance/all-regimes.aspx

[5] See for example: www.socialimpactassessment.net; www.communities.gov.uk; www.scotland.gov.uk; SNH (2005), EIA handbook – guidance for all partners in the EIA process;

Table 2 Impacts that SEPA takes into account in making sustainable development decisions

Economic impacts	Social impacts	Environmental impacts
Scottish economy • direct • indirect	Health Safety Recreation Nuisances Vulnerable/disadvantaged groups Visual impacts	Water environment Biodiversity Landscape Climate change Built heritage Earth heritage Waste and resource use

WAT-SG-67 also describes a consistent approach to determining the significance of any of the impacts listed in Table 2. This approach requires that the magnitude of an impact and the importance of the interest that is being impacted are taken into account, as illustrated in Table 3. In turn the magnitude of an impact is dependant upon it's extent and duration as shown in Table 4. These approaches to determining the significance of impacts are based on approaches employed for Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA).

Table 3 Determining impact significance

Impact importance	Impact magnitude				
	Very low	Low	Moderate	High	Very high
Local	VL	VL	L	M	M-H
Regional	VL	L	M	M-H	H
National	VL	L-M	H	H-VH	VH
International	L	M-H	H-VH	VH	VH

Table 4 Determining impact magnitude

Duration of impact	Impact extent (scale and severity)				
	Very small	Small	Medium	Large	Very large
Very short (< 1 year)	VS	VS	VS	S	M
Short (1-6 years)	VS	VS	S	M	L
Long (> 6 years)	VS	S	M	L	VL

3. Licensing hydro electricity generating schemes

To illustrate the way in which the WAT-RM-34 approach is applied in practice, this paper compares the assessment of two different types of hydro electricity generating scheme. The schemes used in the examples are hypothetical and illustrative, although they are closely related to actual CAR licence applications that SEPA has considered.

3.1 Water storage hydro electricity generating scheme

The first example licence application is for a water storage hydro scheme. This scheme captures water from four different river systems over a mountainous area of approximately 75 square kilometres and causes the ecological status to deteriorate in 9 separate water bodies. The captured water is fed into a new reservoir and the application also includes a series of different water intakes on upland burns and associated aqueducts. A key feature of this scheme is the 600m drop between the new reservoir and the power station. This drop means the scheme can generate on average 150 GWh/year of renewable power which is equivalent to the power that can be generated by around 30-35 typical land based wind turbines. The fact that the water is stored in a reservoir means that this type of scheme is also able to generate power at short notice in response to increases in power demand and increases in power prices. The power that is generated can therefore command a higher than average price which means that the economic benefits from this type of hydro scheme can be significant. Table 5 summarises the significant impacts associated with this scheme for inclusion in the WAT-RM-34 assessment.

Table 5 Summary of impacts of the water storage hydro scheme

Positive impacts (beneficial impacts associated with the new activity)	**Negative impacts (beneficial impacts associated with maintaining the current status of the water environment)**
Economic This scheme is able to generate 150 GWh of power per year at times of higher than average electricity prices. Following the WAT-SG-67 methodology shows the economic benefits associated with this scheme to be of LOW to MODERATE significance.	Economic None
Social None	Social None
Environmental This scheme will generate 150GWh/year of renewable power and will therefore make a HIGH significance contribution towards the satisfaction of Scotland's national renewables targets (see WAT-SG-67).	Environmental This scheme will cause a downgrade in the status of 9 separate water bodies which constitutes a high magnitude impact on water bodies which are all of local or regional importance. Following the WAT-SG-67 guidance would assign a MODERATE significance to this impact.

On balance it can be seen that, for this water storage hydro scheme, the low to moderate positive contribution to the Scottish economy and the high significance contribution to climate change mitigation outweigh the moderate significance adverse impact on the water environment. This scheme would therefore qualify for a derogation from the CAR requirement to protect the status of the water environment and a licence would be issued.

3.2 Run of river hydro electricity generating scheme

The second example licence application is for a run of river hydro electricity generating scheme. This scheme operates by taking water from a river when it exceeds a particular level and using this to generate renewable power before returning the water to the river further down stream. This scheme operates on an 'as take' basis which means that power can only be generated when water levels are appropriate and there is no capacity for the scheme to generate in response to higher power demand or prices. The scheme impacts upon a relatively short distance of a water body which is of regional importance because of its type and character (see

WAT SG 67). In addition the water body that will be affected by the hydro scheme is of at least regional if not national importance for white water canoeing and the proposed hydro scheme would impact upon the use of the river for this purpose.

The impacts of this run of river hydro scheme are summarised in Table 6.

Table 6 Summary of impacts of run of river hydro scheme

Positive impacts (beneficial impacts associated with the new activity)	**Negative impacts (beneficial impacts associated with maintaining the current status of the water environment)**
Economic This scheme is able to generate 11GWh/year of power on an as take basis with no ability to respond to high power prices. The WAT-SG-67 guidance assigns this level of economic contribution a VERY LOW or NEGLIGIBLE significance.	Economic None
Social None	Social The river that is impacted by the scheme is currently used for white water canoeing. The scheme would reduce the number of canoe days on the river by 60% (which constitutes a high magnitude impact) and the river is considered to be of regional/national importance for canoeing. A high magnitude impact on interest which is of regional/national importance gives a HIGH significance impact.
Environmental This scheme will generate 11GWh/year of renewable power and will therefore make a LOW significance contribution towards the satisfaction of Scotland's national renewables targets (see WAT-SG-67).	Environmental This scheme will cause a status deterioriation from high to moderate over 1.5km which constitutes a low magnitude impact. The impacted water body is of regional importance giving overall a LOW significance impact.

On balance it can be seen that, for this run of river hydro scheme, the low significance positive benefits for climate change would be insufficient to outweigh the adverse impacts on white water canoeing and the water environment. This scheme would not pass the sustainable development test in CAR and would not qualify for a derogation from the requirement to protect the status of the water environment. A licence would not be issued for the proposed scheme.

3.5 Very small hydro electricity generating schemes

Since CAR came into force SEPA has applied the above approach to more than 50 different CAR licence applications. So far, the approach described has worked very well and decisions have been made quickly and consistently across a number of different circumstances, not just hydro electricity schemes. The SEPA regulatory staff are becoming familiar with the approach and it is becoming more straightforward to apply.

Recently, however, SEPA has received an increase in licence applications for very small hydro electricity generating schemes. The WAT-RM-34 assessment for the majority of these schemes requires very small positive benefits to climate change to be compared with small adverse impacts on the water environment. The method described above is insufficiently sensitive to these very low significance impacts and it is difficult to use it to inform a balancing judgement. In addition, because these schemes have such small impacts it is important that SEPA develops a proportionate approach to allow consistent licensing decisions to be made rapidly.

SEPA economists therefore started to develop a tool to assist in rapid cost benefit assessments of these very small scale hydro schemes. The results of one of these assessments for a 100kw hydro scheme is reported below. The approach described below assumes a 40 year lifetime for the hydro schemes (2010 to 2050) and follows UK Treasury Green Book guidance[6] by applying a social discount rate of 3.5% for years 0 to 30 and 3% for years 30 to 40.

3.5.1 Carbon benefits assessment

A 100kw hydro scheme generating at 40% efficiency will generate 0.35GWh/year of renewable energy. The generation of 0.35GWh/year of renewable energy can be assumed to save the carbon emissions that would normally be associated with a similar amount of non-renewable energy. Based on the UK energy mix[7], every GWh of renewable energy that is generated can be assumed to save 430 tonnes of CO_2 emissions per year. This means that the average run of river 100 kilowatt hydro power scheme will save 150.5 tonnes of CO_2 emissions each year.

The UK Government (Department for Energy and Climate Change (decc)) has produced a set of prices associated with carbon emissions which they require to be used in all appraisals of public policies that have an impact on carbon emissions[8]. The prices are divided into two groups, one for policies that affect the traded sector (or sectors that are currently part of the EU Emissions Trading Scheme (EU ETS)) and one for policies that affect non-traded sectors which are not part of the EU ETS. The power generating sector is subject to the EU ETS so for the purpose of this analysis it is appropriate to use the traded sector prices. These prices have been set by decc for each year from 2009 to 2050 and they cover a range with low, central and high prices being provided. Table 7 shows the present values of the monetary benefits associated with the 150.5 tonnes/year of CO_2 that are saved through the operation a 100 kw hydro scheme over 40 years. For the purposes of this analysis the central price (in bold) will be used.

Table 7: Financial benefits associated with the carbon emission reductions from a 100 kilowatt hydro power scheme

	Traded carbon prices (£/t CO2e)

[6] HM Treasury (2003), The Green Book, Appraisal and Evaluation in Central Government, TSO.

[7] See http://www.decc.gov.uk/en/content/cms/statistics/climate_change/gg_emissions/gg_emissions.aspx

[8] DECC (2009), Carbon Appraisal in UK Policy Appraisal: A revised approach, a brief guide to the new carbon values and their use in economic appraisal, www.decc.gov.uk

	Low	Central	High
Price (£/tCO2e) 2010	12	21	
Price (£/tCO2e) 2050	100	200	300
PV of carbon benefits associated with 100 kw hydro scheme	£109,173	**£212,628**	£307,034

3.5.2 Water environment damage assessment

Small run of river hydro schemes have an impact on rivers by removing some of the water and replacing it further downstream. Depending on various factors, such as the nature and amount of water flow in the river and the type of hydro turbine being used, different schemes impact upon different lengths of river. For this assessment, hydro schemes are assumed not to have impacts upstream of the hydro scheme intake structure. This will always slightly underestimate the impacted length of a river and substantially underestimate it if the scheme impacts upon fish passage upstream. Notwithstanding this, the impact lengths shown in Table 8 were used for the purposes of this assessment of 100kw hydro schemes.

Table 8 Impacted river lengths used for CBA of 100kw hydro schemes

Impacted river length (m)		
Low	Middle	Upper
300	760	1220

The heterogeneity of the water environment makes it very difficult to assign values to it that can be used in general terms for a piece of work such as this. For this analysis it is assumed that very small hydro schemes are only situated on water bodies that are of relatively low importance. In other words the water bodies are not used by people or biodiversity in any way that would increase their value and we are concerned with water environment that has only intrinsic value.

To determine values for the water environment SEPA economists initially considered investments that had been approved by Scottish Ministers for Scottish Water to make in improving water quality. This data is essentially a source of revealed preference information showing Scottish Ministers' willingness to pay for a high quality water environment.

The following information was gathered from a dataset concerning Scottish Water's Quality and Standards III investment program (2006):

- investments ranged from £25/km/year to £755,966/km/year;
- 8% of the projects had a cost above £400k/km/year;
- 15% of the projects had a cost above £250k/km/year;
- 47% of the projects had a cost under £25k/km/year;
- 45% of the projects had a cost between £25k and £400k/km/year; and
- 37% of the projects had a cost between £25k and £250k/km/year

Following consideration of this dataset, SEPA economists initially decided that a high status water environment was worth at least £25,000/km/year and up to £400,000/km/year. This study however is concerned with low value water environment (with only intrinsic value) so the appropriate value for this might be around £25,000/km/year.

This water environment value was validated by reference to other studies that have developed values for the water environment. In general, studies that assign values to the environment are very site specific and extreme care is needed in transferring figures from one situation to another. However, three studies were considered, as follows:

1. A German study[9] which gives values to compensate for damage to biotopes (three different biotope values are available depending on the model used). These values are used in Germany to make decisions under the Federal Nature Conservation Act to determine levels of compensation payment for environmental damage.

The German figures (in 1994 Deutsche Mark) have been converted into 2006 British pounds and the following values can be deduced for the water environment:
£25,000/km/year for rivers 1.6m wide.
£60,000/km/year for rivers 3.9m wide
£150,000/km/year for rivers 9.7m wide
£400,000/km/year for rivers 26m wide.

The range of values from this study well supports the £25,000/km suggested above by SEPA economists for small water bodies with only intrinsic value.

2. A study by Hanley and Black[10] which determined values for improvements in water quality on the river Clyde. The values attached by residents to water quality improvements from fair to good[11] were £67,500/km/year and for improvements from poor/seriously polluted to good[12] were £168,750/km/year.

These values also compare favourably with those proposed by SEPA economists above. Given that the values from the Hanley and Black study are for residents only it is reasonable to assume that the full value for the water environment might in some cases be higher than these values. The Hanley and Black values are also for a very specific section of the water environment and for specific types of improvements in a heavily populated area where the water environment has more than simple intrinsic value. The lower value suggested by SEPA may therefore be appropriate in situations where the water bodies are small and unused by people or biodiversity.

3. A study carried out by NERA and Accent as part of the UK Collaborative Research Program (CRP) [13] used contingent valuation methods (CVM) to estimate the total value placed by households in England and Wales on improvements to the water environment brought about by the WFD. The study generated non-market values for improvements in the status of the whole water environment except ground waters of £47.1/household/year in England and Wales. The study does not break these values

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[9] http://www.umweltdaten.de/publikationen/fpdf-l/2544.pdf

[10] Hanley and Black (2006), *Cost Benefit Analysis and the Water Framework Directive*, Integrated Environmental Assessment and Management 2(2), 156-165.

[11] (made up of river ecology 28,800/km, aesthetic appearance 14,500/km and bankside erosion and habitat 24,200/km)

[12] (£72,000/km/year for ecology, £36,250 for aesthetic appearance and £60,500 for habitat)

[13] Nera and Accent (2007), Report on the benefits of Water Framework Directive programmes of measures in England and Wales, Collaborative Research Programme on River Basin Management Planning Economics.

down to different types of water bodies (rivers, lochs, estuaries and coastal waters) which makes it difficult to use them to estimate values for rivers in Scotland. The NERA/Accent values only relate to non-market values held by households which they recognise are not the full value for the water environment which is appropriate for this study where the water bodies being considered do not have market uses. However in Scotland, it is reasonable to assume that there are significant values attached to the water environment by non-residents (eg: tourists) and there are also many fewer households in Scotland than in England and Wales so it is possible that the NERA/Accent values will underestimate the full value if they are transferred to the Scottish water environment.

Notwithstanding the above comments, the following calculations can be made to transfer the NERA/Accent values for the non-market water environment benefits to Scotland, although there are numerous assumptions implied in making these transfers and they should be treated with extreme caution:

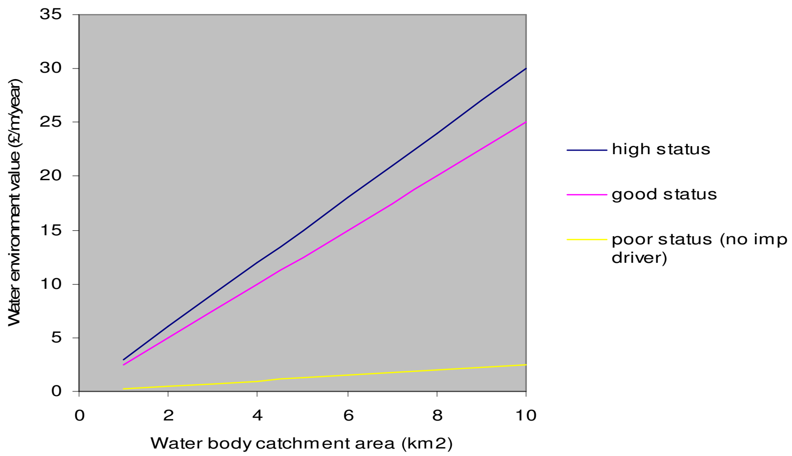
- Number of households in Scotland: 2.3million
- Total value for improvements across whole Scottish water environment: £47.1 x 2.3 million = £108.3 million/year
- Water bodies in Scotland: 2,456 = £108.3million/year / 2,456 = £40,000/water body/year
- Average length of river water bodies in Scotland (main channel length only) = 9.8km
- Average value for river water bodies in Scotland = 40,000/9.8 = £4,081/km/year

As anticipated, the NERA/Accent values for the water environment are significantly lower than the other values for the water environment that have been used as comparators for the SEPA water environment values. The results from the NERA/Accent study may support a case for reducing the £25,000/km/year value suggested by SEPA but the NERA/Accent values are low compared with the other comparators and, given the inaccuracies associated with transferring the NERA/Accent values to the Scottish situation, at this stage any such move would be very difficult to justify.

Most of the above literature adjusts values for the water environment in direct proportion to the size of the water body being considered. The values that have been used for the range of small water body sizes likely to be impacted by 100kw hydro schemes are illustrated in Figure 1, these values are based on the following assumptions:

- Water bodies at good status with a catchment area of $10km^2$ or above are worth £25/m/year. For water bodies at good status with a catchment area of less than$10km^2$ a linear relationship exists between the water environment value (y) and size of catchment area of the water body (x) such that y=2.5x.
- Water bodies at high status with catchment areas of $10km^2$ and more are worth £30/m/year. For water bodies at high status with a catchment area of less than $10km^2$ the linear relationship between water environment value (y) and catchment area (x) is y= 3x.
- Water bodies with a status of less than good but with an objective in the river basin plan to achieve good have the same value as good status water bodies.
- Water bodies with a status of moderate or poor but with no objective in the river basin plan to achieve good have a value (x) which is 10 times less than good status water bodies (ie: y = 0.25x).

Figure 1 Assumed relationship between water environment value and water body catchment area for small water bodies (with catchments of <10km2)



On the basis of the information provided above, the values shown in Table 9, Table 10 and Table 11 for the damage to the water environment caused by a 100kw hydro scheme on water bodies with 10km2, 7km2 and 3km2 catchment areas respectively have been generated.

Table 9 Value of water environment damage (on a water body with a catchment area >=10km2) caused by 100kw hydro scheme

Impact on status	high to good	high to < good	good to < good	> good (no imp driver)
Cost of impact (£/m/year)	5	30	25	2.5
Cost of 300m of impact (£/year)	1,500	9,000	7,500	750
NPV (40 years) 300m impact (£)	**33,899**	**208,836**	**169,493**	**16,949**
Cost of 760m impact (£/year)	3,800	22,800	19,000	1,900
NPV (40 years) 760m impact (£)	**85,877**	**529,051**	**429,383**	**42,938**
Cost of 1220m of impact (£/year)	6,100	36,600	30,500	3,050
NPV (40 years) 1220m impact (£)	**137,854**	**849,267**	**689,273**	**68,927**

Table 10 Value of water environment damage (on a water body with a catchment area 7km2) caused by 100kw hydro scheme

Impact on status	high to good	high to < good	good to < good	> good (no imp driver)
Cost of impact (£/m/year)	3.5	21	17.5	1.75

Cost of 300m of impact (£/year)	1050	6300	5250	525
NPV (40 years) 300m impact (£)	**24,364**	**142,374**	**118,645**	**11,865**
Cost of 760m impact (£/year)	2660	15960	13300	1330
NPV (40 years) 760m impact (£)	**61,723**	**360,681**	**300,568**	**30,057**
Cost of 1220m of impact (£/year)	4270	25620	21350	2135
NPV (40 years) 1220m impact (£)	**99,081**	**578,989**	**482,491**	**48,249**

Table 11 Value of water environment damage (on a water body with a catchment area 3km2) caused by 100kw hydro scheme

Impact on status	**high to good**	**high to < good**	**good to < good**	**> good (no imp driver)**
Cost of impact (£/m/year)	1.5	9	7.5	0.75
Cost of 300m of impact (£/year)	450	2700	2250	225
NPV (40 years) 300m impact (£)	**10,170**	**62,651**	**50,848**	**5,085**
Cost of 760m impact (£/year)	1140	6840	5700	570
NPV (40 years) 760m impact (£)	**25,763**	**158,715**	**128,815**	**12,881**
Cost of 1220m of impact (£/year)	1830	10980	9150	915
NPV (40 years) 1220m impact (£)	**41,356**	**254,780**	**206,782**	**20,678**

3.5.3 Cost benefit assessment of 100kw hydro schemes

The cost benefit assessment of the 100kw hydro schemes requires that the water environment costs be taken away from the carbon benefits associated with the schemes. The hatched boxes in Tables 9, 10 and 11 indicate the situations in which the cost benefit of the 100kw hydro scheme has a negative value and therefore when the 100kw hydro schemes are not cost beneficial.

To summarise, the above analysis shows that 100kw hydro schemes are cost beneficial in the following situations:

- When sited on very small water bodies (with small catchment areas);
- When sited on water bodies which have no particular special features or characteristics;
- When they do not prevent the achievement of a RBMP objective;
- When they do not cause status deterioration to less than good; and
- When they impact on a short length of water body.

The analysis also shows that 100kw hydro schemes are not cost beneficial in the following situations:

- When they prevent the achievement of good status in a water body;
- When they impact upon good and high status water bodies;
- When they are sited on large water bodies;
- When they are sited on water bodies that are used by other interests (eg: recreation or biodiversity); and
- When they impact on a large length of a water body.

Although the cost benefit assessment approach described above is available in a tool format to ascertain whether very small hydro schemes are cost beneficial, it was thought more transparent for SEPA to use the cost benefit results to partially inform the development of standard guidance for developers of small hydro schemes. Also, the assumptions about water environment values that are embedded in the tool mean that it is important that it's findings can be verified by water environment and climate change experts before they are acted upon. The guidance for small hydro scheme developers that SEPA has developed is currently the subject of a consultation[14]. It is this that is likely to be used by SEPA when making regulatory decisions rather than the cost benefit assessment tool.

4. Conclusions – the use of cost benefit assessment in regulatory decision making

Many of SEPA's duties in relation to environmental regulation can usefully be informed by environmental economics. This paper has shown how environmental economics principles can be applied to develop a regulatory method that takes multiple impacts into account in a proportionate and transparent manner. The paper has also described the way that conventional monetised cost benefit assessment approaches can be applied to simple regulatory decisions.

The paper has however highlighted the complexities associated with the regulatory decisions that need to be taken in the environmental sector and it has shown how, even in apparently simple situations, difficult it can be to develop accurate approaches to monetise environmental impacts. Given these difficulties, the paper has described how economic information can be used in practice by environmental regulators to inform their positions and methods without complex, bespoke, monetised analyses being routinely required.

[14] http://www.sepa.org.uk/about_us/consultations/aspx