



WP 5.2 Documentation of effects and elaborating criteria
6th of March 2013

WP 5.2 Documentation of effects on regional economies and
Elaborating common sustainability criteria

North Sea – Sustainable Energy Planning

Period of publishing
6th of March 2013

Organization
ateneKOM





WP 3.1.2 Green Energy Benchmark 6th of March 2013

1	Introduction.....	4
2	General approach.....	6
3	Goals, Principles and Transitions.....	13
3.1	Sustainability	13
3.2	Regional development	17
3.3	Economics.....	21
4	Evaluative questions: general points	27
4.1	Evaluative questions for an SNEI (set I)	28
4.1.1	Energy and environment objectives	28
4.1.2	Social objectives.....	29
4.1.3	Strategy.....	30
4.1.4	Planning approach	32
4.1.5	Organisation, roles, resources and governance	32
4.1.6	Evaluation, learning and dissemination.....	33
4.1.7	Private economic objectives: ex ante	34
4.1.8	Private economic objectives: ex post	35
4.1.9	Public economic objectives: ex ante.....	36
4.1.10	Public economic objectives: ex post.....	36
4.1.11	Regional development objectives: ex ante.....	36
4.1.12	Regional development objectives: ex post.....	37
4.2	Evaluative questions for activities supported or coordinated by a SNEI (set II) 38	
4.2.1	Energy efficiency.....	38
4.2.2	Move away from fossil fuels to renewables	38
4.2.3	Environmental impact.....	38
4.2.4	Move to local/regional energy provision and integration.....	39
4.2.5	Strategy.....	39
4.2.6	Equity and other social objectives	40
4.2.7	Governance.....	41
4.2.8	Evaluation, learning and dissemination.....	41





WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

4.2.9	Private economic objectives: ex ante	42
4.2.10	Private economic objectives: ex post	42
4.2.11	Public and regional economic objectives: ex ante.....	42
4.2.12	Public and regional economic objectives: ex post.....	42



1 Introduction

This paper contributes to the goals of WP5 Evaluation, benchmarking, quality assurance, specifically

- the part of Task 5.1 Quality assurance of value added supply chains concerned with the quality of planning and management in initiatives; and
- the part of Task 5.2 Evaluation in terms of regional impacts and of sustainability criteria concerned with sustainability.

We assume our primary objective in Tasks 5.1 and 5.2 is to produce and justify evaluation procedures and criteria which can be applied both to the specific subprojects undertaken by partners in North Sea - SEP, bearing in mind their focus on planning, and to existing and future sub-national energy initiatives (SNEIs) in general.

These tasks are a crucial part of North Sea - SEP, not least because they should inform the design and operation of the individual sub-projects, setting of goals for them, and the measurement of progress towards these goals.

We distinguish this from the task of providing a set of criteria (II) by which the SNEIs can evaluate the individual technologies, projects or other activities that are objects of their planning. The character of North Sea - SEP and its sub-projects, and their focus on planning, points to criteria in the first set (I) that will be different from those developed for evaluating individual technologies, projects or energy systems.

The two sets of criteria are certainly related, however: some of the issues we raise and criteria we suggest for planning initiatives (I) may be similar to those they need to apply to the component activities they are planning (II); and in evaluating SNEIs we shall often be judging the extent to which they produce improvements in energy provision according to criteria II.

This paper does not definitively present procedures and criteria for evaluation, but discusses how they should be formulated and generates a preliminary set of principles and questions so that North Sea - SEP partners can consider which of them should be included and how they should be developed. It does not yet provide indicators for those criteria we think can reasonably be measured.

The paper does not consider how the evaluations of the SNEIs should be done or who should do them. This will be subject of a separate discussion paper after we have developed and integrated the criteria from the four parts of these tasks [1.1].

We argue that consideration of how SNEIs contribute to environmental sustainability goals inevitably leads to a wider set of criteria [3.4 -3.8]. To put it another way, conceptions of sustainability – especially when formulated as sustainable development – already commonly have a wider scope that entails consideration of economic and social objectives as well as environmental. It is clear that North Sea - SEP intends to consider this wider set of criteria in WP5.

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

Whether or not we should attempt to treat these sets of goals together is highly contentious. We acknowledge here at least that how to reconcile environmental, economic and other social goals, or at least how they can be treated together and how that can be done for specific sub-projects, will be a major theme in this paper and subsequent work in WP5.

We suggest it will be important in North Sea - SEP to reach agreement on the goals to be included in our design and evaluation of SNEIs, and how they should be treated, as well as whether specific environmental sustainability criteria – such as a ‘strong’ requirement on non-depletion of each resource [3.9] – should be adopted.

This discussion draws on a variety of literatures: on sustainability assessment and criteria; on energy and innovation systems; on organisation and governance; and on energy use and consumption. In particular, we try to apply insights from our own field of science, technology and innovation studies, particularly concerning

- the sociotechnical, situated and systemic character of energy provision;
- the nature of and influences on sociotechnical change;
- the importance of including use and users (or consumption and consumers) in our conception of the system of energy provision, as important influences in shaping and changing its configuration;
- the shaping of evaluation frameworks, techniques, classifications and indicators;
- the characteristics of knowledge used in evaluations, particularly its contested and uncertain nature.

The paper also draws on the North Sea - SEP discussion document Sub-National Energy Initiatives, particularly in attempting to devise appropriate criteria for the range of elements we identified there as part of energy ‘planning’. It also tries to accommodate helpful comments from two North Sea - SEP partners on the criteria by which they want their sub-projects to be evaluated.

2 General approach

We argue first that our tasks need to be framed as formulating an evaluation framework and procedure, rather than just set of criteria, so that we can introduce guidance on how SNEIs should be organised, planned and managed and demonstrate how this should be related to criteria for evaluation.

For the moment we take the objectives of the evaluation and the criteria to include:

- judging the performance and success of SNEIs, including against any specific objectives set for them;
- communicating these judgements, possibly to diverse audiences;
- informing strategy development and learning, and adjusting the design and implementation of SNEIs in the light of experience.

We acknowledge however that North Sea - SEP needs to clarify further what this evaluation procedure and the criteria are being used for, and who their intended audiences are, and hence requirements for the framework.

Our evaluation should therefore also focus on the process and characteristics of initiatives, as well as their outcomes and impacts. We should consider, for example, how well they allow for learning and adaptation in the light of early experience and how continuous monitoring and assessment can be integrated with planning and management [5.6].

The evaluation should be from the perspective of the community as a whole, not solely from the point of view of the organiser or private beneficiary of the initiative. This principle is analogous to that in public cost-benefit analyses, which insist on assessing all costs and benefits including those which would appear as externalities to particular parties.

Much of the discussion about sustainability goals for the energy sector attempts to provide principles of strategy, from which criteria could be derived, rather than criteria per se, but it is essential to consider these so that criteria can be derived from them or at least made consistent with them.

We must also consider:

- how sustainability goals sit with other public and private goals of the agencies involved [5.3];
- and how the evaluation framework and criteria that we propose for SNEIs relate to goals and criteria already set by governing authorities and other outside agencies, including national governments providing funding or setting regulations [5.3].

In most cases, pragmatically we have to accept that the goals and criteria we set for SNEIs should not conflict with these other obligations, as this will put local authorities and other initiators of the initiatives in an untenable position. In some cases,

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

however, we may need to argue that these other goals and criteria should be modified or overridden to take into account the sustainability goals we propose for SNEIs – that is, our criteria should take priority over these others because it is no longer appropriate that the latter dominate evaluations.

Much work on sustainability criteria has been directed to producing a single indicator, often of economic and other social activity at a national level, combining measures of different aspects of sustainability. These include such formulations as a ‘genuine progress indicator’, an ‘index of sustainable economic welfare’ or ‘sustainable value added’.

We think the goal of a single index is not appropriate for our purposes, for a number of reasons. The aggregation of measures necessary to produce a single indicator:

- imposes one judgement about the relative value of the individual criteria and hence one set of weightings on the measures;
- makes questionable assumptions about their comparability, or the validity of the quantification undertaken to render them comparable;
- in particular, often entails putting a monetary value on costs and benefits,
- a practice which invites another more serious set of criticisms;
- obscures judgements which should remain open to discussion in a political process of evaluation;
- tends to downplay the uncertainty inherent in each measure and hence in the overall index; and
- undervalues criteria which cannot be quantified and which should be assessed in qualitative terms.

To insist that environmental, social and economic elements of wider conceptions of sustainability need to be assessed separately, and particularly to reject inappropriate quantification and monetising of environmental and social values, means that we have to consider how the separate evaluations are then best treated alongside one another. Not least we must ensure that suitable implicit weightings are maintained and environmental and social goals that we choose not to quantify are not downgraded or undervalued.

Rather than attempting to find a single index applicable to all initiatives, we argue that we should produce a set of criteria and indicators from which we can select a subset appropriate to each initiative [4.7]. Some of these criteria should be common to all SNEIs; others will only be appropriate to certain types of initiative; some indicators may need to be tailored for a specific initiative and will only be suitable for it. For some specific SNEIs or activities under them, the criteria may need to be elabo-

rated in more detail, but this will have to be done case-by-case and there is little that can be said generally in this paper.¹

We shall have to justify the set of criteria chosen for each initiative. We shall therefore need a set of principles for that selection and we shall have to provide guidance on how the criteria are to be applied. In particular, a central problem is that evaluations will inevitably entail multiple criteria that are not consistent, and we must give guidance on:

- how they are to be ranked or prioritised; and
- how conflicting criteria are to be treated – variously seen as some form of resolution, balance, compromise or trade-off.

Even a first level of distinction among criteria, such as that derived from the list of principles provided by Elliott and Clarke below [3.1], introduces potential conflicts, particularly those between local and national benefits and costs.

In this paper we get as far as formulating specific questions for the evaluation around each set of issues or criteria, of the form:

- how well does the SNEI perform on [this criterion]?
- what does the SNEI contribute to [this objective]?
- to what extent does the SNEI address [this issue]?

We also need to develop criteria for the choice of criteria – in particular that they:

- are appropriate for and well matched to the value or goal they are intended to reflect;
- can be measured or assessed in an objective, precise and unambiguous way (whether quantitatively or qualitatively), and are thus not easily contested because of large uncertainties;²
- can be assessed on a timescale appropriate to the purpose;
- are reliable and reproducible – that is, different authorities undertaking the same evaluation would arrive at consistent results;
- are useful to all parties involved;
- are widely acceptable;
- can readily be justified, particularly in terms of the way they reduce complexity, and where we use quantitative measures;
- are easy to implement and not unduly burdensome on the evaluator or participants in the initiative;³

¹ See e.g. the detailed treatment of effects in R Gibson, et al., *Sustainability Assessment: Criteria and Processes* (Earthscan, London, 2005), 173.

² e.g. 'improvement to quality of life' would be difficult to measure and probably irresolvably contentious.

³ Thus we may need to consider ways of reducing the level of data collection and the complexity of calculation involved. These may include the use of deeming, in which a quantity assumed on the

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

- can be revised or adapted easily in the light of experience and without excessive cost – for example, through having to scrap measurement processes and infrastructure;
- do not have unwanted performative effects [2.19];
- can be translated into a simple but valid message or summary for a wide audience including energy users and policy makers, particularly where evaluation methods are complex and outcomes qualified.

Additionally, the number of criteria in the set applied to any SNEI should not be excessive and burdensome. Those selected must be the most significant, but they must adequately cover the range of values or objectives embodied in the project, and all the significant effects, both positive and negative, that it may have. This again points to the importance of understanding how those effects come about.

Some of the criteria will then lend themselves readily to treatment using one or more indicators, either in quantitative terms or in terms of clear categories of performance. There is a value in providing indicators where this is possible and justifiable. We must however be careful not to set a simplistic indicator that is not an appropriate measure for the criterion.⁴

For some criteria it is not appropriate to reduce them to categories or numerical measures, and they will necessarily be assessed qualitatively. We may be able to use expert judgement for qualitative criteria, provided it is obtained consistently and systematically.

For quantitative indicators, we need to acknowledge and estimate uncertainties and sensitivities in data and calculations. We need to ensure that those criteria that are not quantifiable are not ignored or downgraded. For all the criteria and indicators we need to take into account wider debates and criticisms about the approaches, measures and methods.

Similarly we need to develop criteria for the choice of indicators where we are using them, in particular that they:

- are appropriate for and well matched to the criterion they are intended to measure, or at least a good proxy measure [2.14 and note 4];
- do not over-aggregate different measures that should be handled separately;
- are easy to measure or approximate satisfactorily;
- can be measured or assessed objectively and precisely and are not easily contested or prone to uncertainties;
- can be measured or estimated in good time.

basis of average conditions and performance is taken instead of a precisely measured one, as in many feed-in tariff schemes for micro generation.

⁴ For example, the indicator food miles has been heavily criticised as not representing the relative advantages of food production options assessed on a whole system basis.

Taking the last point of 2.13 into consideration, we may need to devise different indicators for different audiences, depending on their interests and their capacity to interpret and understand the intended message.

We also need to take into account that indicators may be inappropriately performative in at least a weak sense – that is, that their use will tend to shape the behaviour of parties involved in ways that were not intended. Particular problematic effects may be that parties try to perform well on the indicator rather than genuinely pursue the value it was meant to represent, or treat compliance with qualitative checklists as a matter of ‘ticking boxes’. Such effects are difficult to anticipate, but we should at least consider in advance such ways in which our indicators may be counter-productive, and ways to avoid this effect.

We should recognise that the more indirect the effect of an initiative, the more difficult it is to argue convincingly that any observable effect is attributable to the initiative, or to measure the contribution of the initiative to it. We should in any case be careful not to overstate these indirect effects of initiatives and make implausible claims about them. We may be able to quantify a change in the region as a whole – for example, the increase in the number of installations of a specific micro generation technology – but we are unlikely to be able to attribute with any precision a particular fraction of that increase to the SNEI.

Having argued generally against indicators that over-aggregate effects [2.8], and noted the difficulties attributing indirect effects to an initiative [2.20], we must recognise that for some regulatory purposes a single indicator capturing an overall impact may be useful and appropriate because of the signals it sends [2.19]. For example, a carbon budget or cap on emissions at an individual or firm level will be more effective in addressing possible rebound effects [3.14] than attempts to control individual activities that generate emissions, as it overcomes the problem of compensatory activity negating the immediate savings.

We need to consider whether and to what extent to align our evaluation framework and criteria to others that have been proposed or introduced. Clearly there is some value in using a commonly accepted framework, or devising a framework that is at least reasonably consistent with sustainability evaluations used in other sectors and particularly in other parts of local/regional government planning. On the other hand we do not wish to be constrained by having to use frameworks that are not ideally suited to our purposes. This is unlikely to be an issue for how we evaluate the SNEIs themselves, since we have found so little guidance on how to do that; it may be an issue for evaluating the activities they coordinate or support [1.5].

Though we do not attempt it in this paper, it will be useful as part of this task to look at the experience of previous energy and related projects – criteria applied in them, targets set in them, or predictive claims made for them, whether these were met, and the arguments around them – so we take these into account and do not repeat previous mistakes or lay ourselves open to the same a priori criticism.

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013



We accept as a general principle that evaluation should be done on a whole system and life-cycle basis: that all inputs to and effects of the operation of an initiative or the system it creates or modifies should be taken into account, and that this should be done for its entire life-cycle including decommissioning and other legacy effects where appropriate. This is especially important where a completely new business model is envisaged – for example, where an energy services model is substituted for conventional delivery of energy. This requirement does introduce more complexity into evaluation procedures and the calculation of indicators. We acknowledge the problems with whole-system and life-cycle analyses in some of their formulations and applications, the dangers in relying solely on their results, the need to justify the particular scope and form of analysis in each case, and the need to consider specific characteristics and conditions rather than take generic values. We maintain nonetheless that some form of the two combined is the only appropriate way to evaluate systems.

It is particularly important to consider the effects of SNEIs beyond their geographical boundaries and to communities other than those covered by them, so we can both ensure that costs are not being displaced elsewhere, and that any wider benefits are attributed to the initiative.

Similarly a long-term assessment of an SNEI may be crucial if its gains are only made on a longer time-scale – perhaps beyond the lifetime of the project activities – and any short-term assessment would disadvantage the option.

We also accept the principle that wherever possible evaluation should entail comparing possible alternatives, at the level of the initiatives as a whole and at the level of specific features and measures, rather than assessing one option or a limited range of options.⁵ Our evaluation should therefore attempt to demonstrate

that an SNEI achieves the maximum improvement (on whatever criterion) or is the best means of achieving that improvement – for example, the most cost effective or efficient, or the option showing the lowest marginal abatement cost or the highest energy return on energy invested [5, question 22, and 6, question 3].

An important issue may be the choice between energy efficiency measures, supply from renewables, or efficiency improvements in conventional supply technologies; typically gains from the first are cheaper and quicker. Options that produce effects most cheaply will presumably always be favoured [5, question 1]. Options that produce benefits faster will be favoured if urgency is an explicit criterion [5, question 4].

In a comparison of options we should also not allow artificial distinctions between the options – that is, attaching particular characteristics exclusively to one or other

⁵ This principle is generally accepted in protocols for environmental impact and technology assessments, and more generally in models of rational policy-and decision-making, though it is often not practised. It has long been argued for example (in the notion of ‘megawatts’) that options for increased energy supply should be appraised in comparison with demand management options using a measure of cost per unit capacity (provided or avoided), but that has seldom been done.





WP 3.1.2 Green Energy Benchmark 6th of March 2013

option, thereby creating an artificial dichotomy and overstating the differences between them.

We should also recognise that evaluations of the effects of different SNEIs inevitably depend on an understanding of the operation of the governance instruments their planning activities rely on and thus incorporate judgements about their efficacy, and that these may be contentious. The implication is that we need to understand how these instruments work and provide sound arguments to justify their selection in each SNEI.





3 Goals, Principles and Transitions

3.1 Sustainability

The basic conception of an environmentally sustainable future we take here is a steady state relation of the social to the natural world which meets human needs indefinitely and does not entail environmental damage and resource depletion. Elliott and Clarke have usefully spelled out principles for the application of this to energy strategies⁶, postulating that energy provision should:

1. not use non-sustainable resources;
2. improve energy efficiency as much as possible;
3. match production and fuel choices to end use (this is a sub-principle of 2);
4. entail designing energy using systems to use energy efficiently
5. minimise local impacts – that is, the degree to which local natural processes and conditions are disrupted – and find suitable ways to trade these off against global benefits
6. not extract more energy from natural flows than a local ecosystem can cope with (this is a sub-principle of 5)
7. stay within natural energy resource limits and carrying capacity

Though the criteria we propose for SNEIs have a broader scope than these basic physical and ecological goals and principles – particularly in that they also concern the management and governance processes by which these can be achieved – our criteria should be consistent with them.

Several reviews of sustainability criteria for energy technologies make the point that experts do not yet agree on an appropriate set of criteria.⁷

Some of the criteria we propose may not appear to be related to sustainability in the narrower environmental sense [1.9]. They derive rather from other characteristics we argue are desirable for SNEIs, and often correspond to those suggested for notions of social and economic sustainability.

In particular, we shall argue here that:

- the local nature of SNEIs means we should evaluate how well lessons from them can be derived and disseminated [5.6];
- the role of learning and adaptation, and other beneficial effects of harnessing the active involvement of energy users and other interested parties – as well as principles of democratic involvement – require that the governance of

⁶ D Elliott & A Clarke, 'Developing Criteria for Sustainable Energy Technology', International Journal of Global Energy Issues 9(4/5), 1997, 264-274

⁷ T Buchholz et al., 'Sustainability Criteria for Bioenergy Systems: Results from an Expert Survey', Journal of Cleaner Production 17 (Supplement 1), 2009, S86-S98. In their expert survey of criteria, Buchholz et al. make the further point that those criteria ranked low in importance were those on which there was little consensus, suggesting it is debatable whether they should be included in sustainability assessments at all.



SNEIs be transparent and inclusive, and thus provide appropriate opportunities for participation.

It will also be evident that we assume that values like equity of access to resources, social inclusion, equitable distribution of benefits and burdens, respect for cultural differences, avoidance of disruption of traditional cultures, more decentralised control over production and consumption, and other forms of environmental justice, should be included in our evaluation. In many cases these other criteria should not be taken to override choices on environmental sustainability grounds, but they should certainly be considered alongside them and should influence choice *ceteris paribus* between alternative solutions.

The argument has certainly been made that such values in economic, political and cultural systems, and the changes needed to achieve them, are necessarily entailed in a transition to environmental sustainability – that it will not be possible to attain sustainability unless these changes are made. Conversely it has been argued that sustainable energy futures are necessarily part of a vision of a markedly different social formation. Others contend however that the objectives are not logically linked and their desirability must be argued separately, or that at best it is only possible to argue that they might facilitate, or contribute indirectly to, the achievement of environmental sustainability.

An important example of this relation is the requirement for an appropriate way of handling the inevitable trade-off between local and wider costs and benefits of an energy production facility [2.10]. It can be argued on the one hand that an open, transparent and participatory process to establish this is necessary; or on the other hand that it is only desirable on other grounds or pragmatically useful, and that such a resolution could be achieved by more authoritarian or technocratic forms of decision-making.

We need not resolve these debates here nor take a firm position on the relation between these goals. There is indeed a danger in making and relying on tenuous arguments linking them, as if all desirable objectives can be and need to be justified in terms of sustainability. We shall therefore argue for the inclusion of these wider criteria on grounds other than environmental sustainability as well as in terms of the contribution they may make to achieving it. But we also point out that since it is not self-evident that they are required by our basic goal of environmental sustainability we need to agree on their inclusion – among North Sea - SEP partners and presumably with its audiences.

We recognise that definitions of sustainability, and thus the ideal goal of a sustainable energy future, are themselves contested: while there may be agreed general principles, the character of that future in detail is not clear. One important distinction is between weak and strong notions of sustainability: the weak notion allows substitu-

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

tion of different forms of capital; the strong requires that no other forms of capital be substituted for environmental and natural resource capital.⁸

In practical terms, however, we shall seldom be assessing whether the goal of any initiative when implemented is itself truly sustainable energy provision, but rather whether it represents a move towards that future state [5.1]. This raises a difficult question which itself needs to be addressed in our evaluation: whether a change which appears to be appropriate in environmental terms, and perhaps scores well on certain short-term criteria such as an immediate reduction in carbon emissions, does move us towards a sustainable state or instead presents longer-term obstacles to its achievement.

This question arises for increases in energy efficiency or reductions in emissions from technologies that should ultimately be phased out. It is particularly important for technologies that may entrench – or ‘lock in’ – undesirable aspects of current energy provision, for example by strengthening institutions that do not have a longer-term commitment to sustainability or prolonging the life of inappropriate infrastructure or practices.⁹ Thus changes in energy provision brought about by a particular SNEI may themselves become locked in – in addition to the possibility that they further entrench some aspects of existing energy provision. For example, district heating with gas CHP could be seen as desirable in that it increases energy efficiency and reduces CO₂ emissions in the short term, but might entrench this supply technology in a way that hinders subsequent moves away from reliance on gas.¹⁰

Similarly, there is an argument for avoiding technical fixes that do not address underlying social causes and hamper fundamental cultural shifts – in effect perpetuating entrenchment of use patterns requiring high consumption. Again, although it is not easy to make this distinction and judgement and they may be contentious, we need at least to ask this question of energy initiatives.

This general question is a reformulation of the dilemma of radical versus reformist (or incrementalist) strategies. We suggest here that it should be possible to devise criteria that overcome this division – that assess whether an incremental move apparently in the right direction is consistent with the long-term goal.¹¹ It will however

⁸ At the level of individual initiatives, we may therefore be able to suggest measures of value-added beyond the maintenance of existing capital – e.g. where the cultivation of biomass results in a negative carbon balance. (???)

⁹ It has been considered in relation to carbon capture and storage, which some critics argue further entrenches our reliance on fossil fuels and will hinder a move to greater use of renewables.

¹⁰ Of course, assessment of options over the long term has acknowledge the possibility and desirability that new aspects of energy provision become entrenched in this way; some degree of lock-in is essential for new technologies and practices to become established.

¹¹ At an abstract level, this argument draws on notions of ‘mixed scanning’ approaches as a way of overcoming the shortcomings of both of synoptic rationality and incrementalism: that approaches can be devised that allow incremental change, flexibility, continuous evaluation and adaptation, while avoiding the conservatism and risk-aversion associated with incrementalism and retaining strategic goals and a radically different envisaged future.

require a developed understanding and a convincing account of the relation between the initiative and the broader transition to sustainability, and this may not be available or easily produced.

A particular form of the problem is the set of postulated rebound effects, in which measures to increase energy efficiency result in activity that increases consumption of energy services. Mechanisms for several levels of rebound effect have been suggested, ranging from immediate compensatory behaviour by individuals to macro-economic effects. The magnitude of any effect is also contentious: it may range from minor losses of benefit to complete negation or even increased overall consumption (often known as backfire).¹² Since the arguments for the existence and extent of these effects are contentious, and the evidence for any of them limited, we should not assume any particular pattern of rebound will ensue from attempts to increase energy efficiency, but nonetheless we should consider possible forms of rebound effect that may result from energy efficiency elements of specific SNEIs.

The observation that we shall generally be assessing improvements in energy provision, and assessing relative performance in comparisons of options [2.25], raises a second set of issues for measurement in some of our criteria: the baseline or benchmark against which improvements are gauged. We may need for some purposes to distinguish among different baselines or benchmarks and specify which is most appropriate. For example, we may need to choose between current local, current average (over a wider area), mandatory or best practice.

For future projections, the appropriate comparison may be with the effects of a business-as-usual scenario or a scenario with the interventions already proposed by another agency (that is, without the additional activities proposed for the SNEI). Forecasting may be complicated by uncertainty about activities and effects in other regions – for example, whether national or European demand for biomass will push prices up. It is thus likely that our attempts to evaluate SNEIs will reveal a need for regional plans to be ‘joined up’ in some way.

Questions thus arise about which are the appropriate baseline conditions and how best to measure them, what conditions to take against which the future performance of an initiative should be evaluated, or how to allow for uncertainty in those.

In particular, in the context of levels of energy use and emissions that are likely to continue to increase, we shall obviously not be able to measure a tangible decrease in these measures and may need instead to gauge the effect of an initiative in slowing the rate of increase or keeping below a crucial threshold.

¹² Similarly there may be a similar rebound effect from increased deployment of renewable energy: that some consumers may consider it comes with a moral permit to use unlimited amounts. There may also be indirect effects of energy efficiency measures that counter the rebound effect: e.g. that adopting one energy efficiency measure increases individuals’ general awareness and leads them to pursue further measures. Such effects would need to be investigated empirically.

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013



The ease of transforming and decarbonising energy provision in each region may differ markedly according to existing physical or institutional conditions. So there is an argument for measuring improvement in a way that takes into account those differences in difficulty, rather than against a baseline that is common across regions and expecting the initiative to result in a common rate or extent of improvement on the criteria in the second set. In other words, on some criteria we may need a form of evaluation similar to a sporting handicap. Again we need to be careful in selecting or dropping criteria for an evaluation which acknowledges such differences in conditions: it may be appropriate to measure efforts made by a region to improve energy performance rather than just to compare its achievements with others; but it will still be necessary to consider the cost effectiveness of those efforts.

3.2 Regional development

Evaluation of the regional impacts of a SNEI is intrinsically on a public basis [2.5]. It can be ex ante or ex post, and should thus inform decisions both on the design and launch of a SNEI and on its continuation or reform [2.10]. In practice the allocation of effects to our categories of ‘public economic’ and ‘regional development’ has turned out to be largely arbitrary.

The regional impacts will depend not only on the characteristics and performance of the SNEI, but also on the features of the regional context – the general state of its economy, industry and natural and built environment, particularly in comparison with other regions in the country; the depth and intractability of the specific challenges it faces; the scope and efficacy of regional and local governance, and particularly the extent of devolution of powers from central government; and for our purposes particularly the presence and quality of their sources and activities needed to realise the potential benefits of the SNEI.

Specific goals for the contribution of a SNEI to its region may need to be set according to particular characteristics of, for example, its employment patterns and industrial structure.¹³

To some extent then, the impacts of a SNEI may depend on – and the benefits may be enhanced by – actions to change conditions in the region, and it may be necessary and possible to identify complementary actions that will ensure the success of the initiative and secure its maximum impact.

We shall not be free to set all the objectives and criteria for regional development; some may come from existing regional development guidelines or plans, or from



¹³ For a useful comparative review of the concerns of regional development policies in Europe, see D Yuill et al., *New Policy Frameworks, New Policy Approaches: Recent Regional Policy Developments in the EU and Norway*, EORPA Paper 08/1, European Policies Research Centre, University of Strathclyde, Glasgow, 2008.

legislated obligations. Partners will need minimally to ensure that criteria developed in North Sea - SEP are consistent with those imposed on them from elsewhere.

We need first to identify exhaustively the relevant objectives of regional development and corresponding categories of regional impact.¹⁴ We suggest some here, but it is important for partners to extend this list so that we can be sure it is comprehensive. Here we have framed the impacts mostly as improvements, but for some of these items we may also have to acknowledge possible negative effects on the region:

- the creation and/or growth of industries and activities to provide inputs, services and infrastructure for the SNEI, possibly allowing a supporting industry to achieve critical mass or economies of scale;
- in particular, the development of appropriate clusters of energy-related activities which can take advantage of co-location;
- in particular, strengthening the regional innovation system for energy – the capacity to generate and implement future innovations in energy efficiency and renewables – especially by filling gaps in its capabilities and by encouraging entrepreneurship;
- increasing the amount of energy services purchased within the region and keeping a greater proportion of energy payments in the regional economy;
- improving the competitiveness of a region where its industry competes with other regions in the country or internationally;
- increasing the resilience or adaptability of a regional economy, particularly by diversifying its economic base;¹⁵
- establishing an appropriate regional contribution to national efforts to move the energy sector towards sustainability;
- immigration or emigration of labour in specific occupations;
- stimulating and supporting technological change in existing industries;
- stimulation or redirection of research and teaching activities in education institutions;
- the growth of new activities around knowledge outputs of the SNEI;
- wider adoption, through deliberate dissemination or through a demonstration effect, of the practices and technologies used in the SNEI;
- raising the profile of energy issues in the region and particularly
 - integrating energy evaluation and planning into policy and planning processes in regional and local authorities, and

¹⁴ We have drawn these regional development objectives mainly from general discussions of regional development and a selection of regional strategies. We have not attempted to address all the objectives commonly addressed in regional strategies – only those we judge are relevant to energy initiatives. We omit here impacts on the natural environment of the region; these are dealt with in the earlier paper Evaluation: Sustainability and Management.

¹⁵ Note that modernising or diversifying economic structures is one of the key targets of ERDF support.

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

- encouraging the incorporation of sustainability objectives into the activities and planning of a wider set of organisations;
- increased profitability of other activities or availability of services through changes in energy costs;
- reduction in disparities in resources and standards of living in the region, particularly between urban and rural areas;
- wider benefits from closer cooperation and mutual support among industries and agencies involved in the SNEI;
- protecting or enhancing the distinctive character and natural and cultural environment of the region;
- increased intra- and inter-regional cooperation and exchange of knowledge;
- increased interaction with other regions around energy issues, and tourism among lay people and professionals drawn to the region by the SNEI and associated activities such as conferences;
- various less tangible effects of renewal and regeneration on the vitality and attractiveness of the region;
- decline in industries associated with displaced energy forms;
- effects on employment levels, in aggregate and in specific activities and occupations;
- other effects on the availability and price of labour, equipment, services and materials used elsewhere.

We formulate here evaluative questions appropriate to these impacts we have identified, but we shall need to do the same for additional impacts partners may add to our list.

We must include any indirect effects of the initiative – for example, through its effect on the industries with which it competes and through any defensive reactions by those competitors. We need not restrict the objectives to those which directly benefit the region; it may be appropriate to consider objectives addressing the region's contribution to the national and European transition towards sustainability in energy provision.

We should not assume that all changes towards regional development goals as conventionally defined in economic terms will be considered universally beneficial. For example, in any drive to modernise industry in a region, and particularly if there are movements of population and changes to occupational patterns and settlement in the region, there may arguably be some loss of social capital or traditional culture, including local sense of community. Such changes may disproportionately affect the least privileged sections of the population and currently depressed localities – those least able to respond to and take advantage of the required changes – and therefore tend to open up social and geographical disparities even when there is an overall increase in prosperity. An improvement in public services or an increase in public participation in decision-making might entail unwelcome increases in bureaucracy.

There may be no obvious ways we can anticipate SNEIs being linked to such political and cultural effects, but ex post it will be important nonetheless to be sensitive to that possibility, to try to identify such, and generally not to ignore the downside of any positive changes.

Knock-on or multiplier effects of SNEIs may be significant, but are likely to be difficult to quantify. Using resources indigenous to the region (wind, sunlight, biomass) may reduce financial outflows from the region as energy payments, but predicting how these redirected revenue streams will impact a regional economy (e.g. the extent that they are directed into further investment in regional infrastructure, or cycle through the local economy as payments for goods and services) is not straightforward, particularly if the private sector is involved in exchange for a share of revenues. The impact of the SNEI on the cost of energy services will also have knock-on impacts for the regional economy the scale of which may be difficult to predict. As noted in Evaluation: Sustainability and Management, initiatives that reduce both the environmental impact and financial cost of energy services may suffer a ‘rebound effect’ where money saved is spent on other activities with adverse environmental consequences (such as more holiday flights). We should adopt as far as possible a consistent approach across our evaluations to knock-on economic effects and their rebound implications for environmental impacts.

The impacts of a SNEI in a region will be difficult to separate from other changes in the region not attributable to it, such as those resulting from general increases in productivity or general trends in the mobility of capital across regional borders. It will be essential to mount a convincing argument for any effect, not only identifying a correlation but also specifying the mechanism by which the initiative had the claimed effect.

For this reason we should not expect that general measures of regional economic development like those routinely made by regional authorities will assist us greatly in evaluating the regional impact of a SNEI; they are unlikely to offer any insights into the causal mechanisms behind the indicators.

Where the SNEI may have had a catalysing effect on change, it will also be difficult to decide how much of the resulting benefits should be attributed to it, and how much to the changes it supported; again the portion of change attributed will be somewhat arbitrary and will need careful justification.

Beyond those effects for which we can find clear correlations, identifying and attributing impacts requires some form, however simple, of macroeconomic modelling at the regional level, or of microeconomic modelling where the impact is the aggregate of consistent responses of individual firms. The models used maybe contentious and need to be justified where they are not widely accepted. Again, while it is important for us to identify all the beneficial effects of an initiative, we can expect, and must guard against, a systematic tendency to attribute more of a positive effect to the initiative than is justified.

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

Conversely, there may be potential benefits of a SNEI that might otherwise reasonably have been expected to eventuate but that were frustrated by contingent events outside its control. Such occurrences still need to be identified and included, at least as qualitative discussion, in the evaluation of the initiative.

As with other effects where it may be difficult to demonstrate credibly a direct connection, it may be appropriate and justifiable to use a proxy measure, say, of activity rather than outcomes: for example, gauging a level of networking or cooperation among actors as evidenced by measures of contact, exchange or partnerships, or by the expert judgement of observers:

- measuring the numbers of organisations that have taken up energy-saving ideas coming from an initiative;
- measuring enquiries to a local authority about energy saving measures, the level of engagement of citizens in energy-related activities such as discussion forums or local meetings, or the take-up of energy training opportunities.

3.3 Economics

A requirement of good economic performance would be set for any new venture.

Here however there is a particular consideration for sustainability initiatives that will keep surfacing: it is widely suspected that the goal of environmental sustainability can only come at a cost to the economy and at the expense of prosperity – that is, there is scepticism that ‘green growth’ is possible. There are strong counterarguments: in general that economic, social and environmental goals cannot be pursued separately and in particular that a green economy is consistent with high employment and job generation, especially because many energy efficiency measures and renewables technologies are decentralised and relatively labour-intensive. These points however are not yet widely accepted. It is therefore particularly important that our arguments for the economic benefits of SNEIs, and that environmental objectives can be made consistent with conventional economic ones, are sound and convincing.

Achieving this complementarity requires economic objectives to be aligned to sustainability objectives either:

- through the careful design of industry structures and markets in and around an SNEI, so that economic incentives to act sustainably are an intrinsic part of their normal operation, and conversely that incentives to use energy wastefully are eliminated; or
- through externally imposed governance measures, such as subsidies for suitable technologies, or restrictions on activities which are not sustainable.

We can expect that economic benefits in the case of SNEIs will come primarily through:

- the effect of increased energy efficiency and reduced energy costs, however these benefits are distributed among consumers and providers;
- increased economic activity around energy provision and associated products and services.

Less directly, SNEIs may produce knock-on increases in regional economic activity as energy payments are retained to a greater degree within the region.

Local authorities can play a crucial role in establishing or catalysing these conditions, but must try to understand how best to do so. This entails understanding the different effects of the many choices available to them in the structure and operation of SNEIs, and to them and central authorities in the design of governance regimes.

We make two important distinctions here in the purposes of evaluation. Both sets will be important to SNEIs, but the considerations applying to each are somewhat different and it is important not to confuse them.

The first distinction is between private and public evaluation: that is, between the costs and benefits as they appear to the organisation undertaking the activity, and as they apply to the community as a whole.

Generally the responsible organisation makes this calculation primarily and ultimately on the basis of a financial balance. The balance depends crucially on the organisational form and the business model chosen for the venture. Here the principal objective must be to include in the evaluation all the costs and income that can reasonably be attributed to the initiative. The list must include all development and support costs, and the assessment should attempt to account for costs which are shared with other activities. The list must include possible outcomes and future events that have to be assessed as risks – anything where the outcome is not determinate and has to be assessed as a range of probabilities and consequences and hence an expected value.¹⁶ Some of the effects of an activity on this private balance may be indirect and diffuse – for example, through an enhanced reputation or ‘green’ image – rather than through immediate and easily measured income. These indirect effects must nonetheless be taken into account, and if the financial balance is marginal it may be necessary to assert their importance to private partners in persuading them to be involved in a venture.

The size of the cost and income components under the control of public agencies in the venture will depend on the strictness of accounting controls on their activities, generally set in legislation and varying between countries. In some cases, expenditure and income on specific activities may be strictly ring-fenced. In others it may be possible and legitimate for one activity in effect to subsidise another – for example,

¹⁶ For example, the costs, in the form of penalties or compensation payments, of injuries to workforce or public.

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

for the revenue gained through greater efficiencies to be channelled into cheaper energy for social housing occupants or other low income groups.¹⁷

The second, public, set of costs and benefits is much wider than the first. It contains many more items that are contentious, intangible or difficult to quantify.¹⁸ It includes all the benefits that the organisation has not been able to internalise, and all the social and environmental costs it has not been forced to internalise through regulation or through moral pressure and corporate responsibility.

Generally we can also expect longer-term objectives and assessments to be possible here than in private evaluations. Some of the benefits, such as emissions reductions, will be national and international, but it may nonetheless be important to attribute them to the region – in effect to treat them as at least partly internalised – where the region has been given targets for reductions as part of national strategies.

One major implication of this distinction is that there may be arguments around an SNEI about which form of evaluation should take priority in a decision to undertake the venture – whether, say, a poor showing by conventional calculations on the balance sheet of the organisation should be outweighed by the public benefits. Such a position may then lead to:

- debates about the importance of particular costs and benefits, especially those which have not been quantified; and
- attempts to internalise more of the benefits – say to revise the business model to produce a greater income to the organisation – or to socialise more of the costs.¹⁹

¹⁷ In the UK, for example, early legislation governing the involvement of local authorities in district heating sought to prevent what critics could depict as a subsidy to the heating costs for social housing tenants, which was argued to be a welfare objective. This imposed restrictions on the way that local authorities could calculate the notional prices of heat and electricity from CHP schemes and in some cases prevented them from pitching the price of heat sufficiently attractively to ensure available subscription to the scheme.

¹⁸ The second major difference that cost-benefit analysts would insist on between a private calculation and a public CBA is that opportunity costs rather than market costs are used for some items. For example, the cost of labour in a public CBA may appropriately be taken as much lower than the cost of wages to the employing organisation if there is high unemployment in the locality. While it will probably not be necessary to concern ourselves with the precise calculation of opportunity costs in our evaluation, as we are not intent on applying monetary costs to all items in it as in a full CBA, it may nonetheless be necessary at times to make the distinction in qualitative terms. To use the same example, it may be important to draw attention to the employment generated in an SNEI and show the public benefits of increased employment even though the costs to the employing entity may appear high.

¹⁹ We do not want here to take a position on the rights and wrongs of any such move; we simply point out that they are the likely consequences of a marginal result.

There is a second distinction between purposes of evaluation that is central to our discussion here and to our choice of methods:

- ex ante evaluation of an SNEI and the activities it will support, with a view to deciding whether to undertake the initiative and to comparing different options for business models and other features; and
- ex post evaluation, undertaken during and after the lifetime of the initiative to gauge its performance on the basis of actual results.

Ex ante evaluation is of course an exercise in anticipating the future, and many of the considerations and problems that apply to futures work in general are relevant here, especially concerning

- how to allow for uncertainties and unknowns, including changes in relevant regional and national conditions, and
- whether and how to discount future costs and benefits in calculations of present value.

Many ex ante questions imply a further set of questions addressing the changes that might have improved the benefits of the SNEI or reduced its costs, for example through changes to the business model. We do not suggest such questions here.

The organisers of a SNEI may use ex ante evaluations of the activities supported by it in order to identify:

- which activities are likely to be financially viable or attractive;
- whether activities are likely to be financially viable for private or public sector participants, particularly in light of the different discount rates generally employed in each sector for ex post evaluation;
- which, if any, particular aspects of the ex ante evaluation for each supported activity might undermine the financial viability of the activity but which could be remedied by intervention from the planning SNEI.²⁰

These ex ante evaluations may also be useful in persuading organisations to participate.

However, the extent of ex ante and ex post evaluation of activities supported by an SNEI will be limited by access to information on the planning or performance of the activity, or by the extent to which participants have collected and analysed such information themselves. It is likely that much of the information will be treated as commercial or otherwise confidential. It is nonetheless important for an SNEI to encourage participants to make as much information, or results of their own analysis,

²⁰ Aspects of ex ante evaluation of the financial viability of specific activities which a SNEI may intervene in include various forms of risk (e.g. that insufficient demand for an activity's output will materialise), access to capital and liquidity (e.g. SNEIs may require bridging loans to cover particular periods of their development). Generally public authorities can borrow at lower interest rates than private companies, so a regional energy plan may include facilities for low cost loans, perhaps tied to specific parts of particular activities, such as connection to a heat network.

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013



available as possible to enable effective evaluation of the initiative as a whole. Accordingly we have suggested only a small number of questions for these individual activities, and not prejudged the adequacy of the information or answer that is offered by participants nor who should undertake the evaluation [5.1 & 5.2].

Ex post evaluation may be undertaken not just to provide an account of the initiative after its effects have become evident, but also during its lifetime to inform decisions on whether to continue it or whether to make changes in its operation – that is, continuous or intermittent evaluation is essential for learning.

Many ex post questions will correspond simply to their counterparts in the ex ante version: an important question for learning from the ex post findings is whether the actual performance corresponded to the ex ante evaluation.

The outcome of both private and public evaluations will depend to a large extent not just on the design of the venture and characteristics and choices over which the organisation has immediate control, but on wider conditions in the region and country and on changes in them over the lifetime of the venture. This observation has important implications for how we evaluate SNEIs, especially in allowing for uncertainties in ex ante evaluations. We must include an assessment of this dependence: how much will changes in these conditions affect the performance of the initiative?

Recognising the extent to which the performance of an SNEI is dependent on external conditions must then prompt us to ask what changes to these conditions it is possible to get through actions by the organisation or specific partners, whether these possibilities are recognised before or during the initiative. A local authority may, for example, be able to improve the provision of appropriately skilled labour in the region, perhaps by offering retraining schemes or incentives to move to its area. Any partner may lobby central or regional government for measures that improve conditions for incoming industry, or to remove a regulation that restricts the activity. This observation does not significantly affect our discussion of evaluation here. It is however important for understanding the links between WPs 3 and 5: the way in which the performance of a SNEI is affected by choices in setting up the SNEI and the conditions in which it operates.

We have already put forward in Evaluation: Sustainability and Management some general principles concerning the treatment of uncertainty in evaluations, and these apply here, whether the evaluation is ex ante or ex post, private or public.

Additionally in the case of economic evaluations, we must avoid the understandable tendency towards a systematic error: to overestimate the benefits and understate the costs. In the responsible organisation as a whole, there is unlikely to be such a tendency; we can assume the organisation has an interest in an objective and realistic appraisal and not to be led into a loss-making venture.

However, we should recognise that the part of the organisation proposing the venture may have an interest in overstating its net benefits. This may imply that this section





WP 3.1.2 Green Energy Benchmark 6th of March 2013

should not be solely responsible for its evaluation, and that its account be subject to external scrutiny. It is important that our evaluations are robust and stand up to criticism.



4 Evaluative questions: general points

In the following sections we present our preliminary list of the areas which we think we need to address in our two sets of criteria: those for SNEIs (set I) and those for the activities and effects which the initiatives are intended to influence (set II).²¹

In sections 5 and 6 we formulate I and II as sets of questions which need to be addressed, without prejudging whether they should be answered quantitatively or qualitatively.

In both sets, we have avoided for the moment questions about economic performance and regional impacts, which are being considered separately [1.1].

The criteria in set II can more straightforwardly be derived from those suggested for energy and other projects in general, such as those we have pointed to from Elliott and Clarke [3.1]. These are the ones more likely to be amenable to quantitative criteria and indicators, though their evaluation should in all cases also include a qualitative response as well.

The criteria in set I form are more difficult, and we can find little guidance from other work. In most cases we can expect only qualitative answers to them.²² In some cases the evaluation will be contentious, and its acceptability will depend on how thoroughly and convincingly it is argued.

We have already noted the difficulty with attributing to the SNEI a particular fraction of an improvement in some indicator for the region [2.20]. In addition to this, in some cases – and particularly where the connection between the SNEI and the outcomes are difficult to demonstrate with evidence – the answers to the evaluative questions may have to be framed in terms of the potential (from prior argument) for the SNEI to provide improvement, rather than its actual performance. It may thus be appropriate and sufficient to ask questions of the form:

- Does it explicitly acknowledge ...?
- How well or how thoroughly does it engage with ...?
- How well does it attempt to ...?
- Does it have the potential to ...?
- What ... effects is it expected to have?

Clearly we have identified a dauntingly large number of questions in both sets and especially in set I for the SNEIs themselves. While some of those in set I are applicable to all initiatives and we argue should be applied to all, some are not, and users

²¹ Grouping the issues and criteria in this way inevitably produces overlaps and raises questions about the suitability of the groupings and the categories, but our main concern here is to ensure we have covered all the relevant issues and effects.

²² E.g. an evaluation of the scale and significance of the intended outcomes of an initiative [5.3, question 11] may need to acknowledge not just direct energy efficiency gains from the installations it facilitates, but also a demonstration effect.

will have to select those they think are appropriate. The selections from set II for specific activities are likely to be smaller, because fewer will apply to anyone activity. Even so, the number of questions will be considerable and we may have to think about prioritising them in our evaluations, taking into account the criteria for their selection in sections 2.13 and 2.17.

For set II, our discussion of baselines and comparisons [3.15-3.19] means that in each case we have to specify appropriate ways of measuring improvements – for example:

- against current performance
- against the level of improvement that could be expected without the activity.

But these will have to be decided and justified for each activity.

For several of the sub-projects of North Sea - SEP, we shall probably have to define further questions and indicators specific to their goals and activities that we cannot anticipate here.

4.1 Evaluative questions for a SNEI (set I)

4.1.1 Energy and environment objectives

1. How effectively does the SNEI encourage or enforce the basic objectives of set II among the activities it is designed to stimulate or coordinate:
 - increase in efficiency of energy production and use;
 - reduction in demand for energy services where appropriate;
 - increase in uptake of and production from renewables;
 - adoption of renewable energy technology on appropriate scales;
 - decrease in use of and reliance on fossil fuels;
 - drawing in activities in energy supply chains to the region;
 - reduction of associated environmental impact, particularly the disruption of local natural processes and conditions;
 - enhanced security or reliability of regional energy supply;
 - cost-effectiveness, lowest cost, or highest benefit/cost ratio, among options for achieving these objectives?

How much impact does the SNEI have on the objectives of set II compared to other initiatives in the region with a similar focus?

2. To what extent and how well does the SNEI encourage the local integration of energy provision, particularly through
 - coterminous production and consumption of energy
 - stimulating appropriate use patterns to match local supply, or supplies that can match local needs

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

- coordination of local generation, transmission, distribution and use, where responsibility for these is separated
 - matching quality of supply and use
 - allowing for short-term and seasonal variability in supplies, especially from renewable sources
 - reuse or cascading of heat?
3. How well does the SNEI coordinate individual installations of renewables or efficiency measures in a region, so that, for example,
 - their operation can be improved
 - their impacts can be enhanced
 - their costs reduced
 - economies of scope and scale can be exploited?
 4. Over what period does the SNEI have effect: short-term (within the lifetime of North Sea - SEP)? Long-term (outside the lifetime of North Sea - SEP) or continuing from the short- to long-term? Are the changes encouraged by the SNEI on an appropriate timescale for the problem?
 5. Are the SNEI, and the activities it is designed to stimulate or coordinate, consistent with the long-term goal of achieving sustainable energy provision [3.10-3.14]? In particular, does the SNEI avoid encouraging the entrenchment of transitional technologies that will subsequently be difficult to move away from? Does the SNEI encourage the adoption of fundamental and durable changes in practice rather than technical ‘fixes’ that avoid tackling the underlying causes of energy wastage? Does it consider and at least attempt to avoid potential compensatory behaviour and other rebound effects?

4.1.2 Social objectives

1. To what extent and how well does the SNEI engage with the goals of improving intra- and inter-generational equity and other distributional or environmental justice issues? In particular, does the SNEI engage with the goal of alleviating energy poverty?
2. To what extent and how well do the SNEI, and the activities it is designed to stimulate or coordinate, protect the interests of energy users as consumers and citizens – for example, by avoiding monopoly supply, maintaining appropriate competition, and providing grievance procedures?
3. To what extent and how well does the SNEI engage with the goal of ensuring health hazards and safety are taken into account in energy projects? How adequate is its approach, to the extent it can influence hazard management in the projects and activities it is designed to stimulate or coordinate?
4. To what extent do the SNEI, and the activities it is designed to stimulate or coordinate, increase local/regional social capital in the form of
 - social cohesion

- skills and capacities
- creativity
- sustained networks
- effective and durable organisation
- cooperation and participation
- appropriate cultural shifts and changes in practice
- robust understandings and values?

4.1.3 Strategy

1. Does the SNEI have clearly stated and realistic goals or targets, and a well developed strategy for achieving them? Does it demonstrate a good understanding of its pathway, its operation, and obstacles to it?
2. What is the scale and significance of its intended results compared to the size of the problem it addresses or the scale of the changes required?
3. Does the SNEI identify and target the right points, or the right combination of points, in the chain or system for maximum effect in transforming it? Does it identify the most effective way of changing current practice and technology?
4. Does the SNEI have a sound business plan and business model? Where appropriate, can it be economically self-sustaining in the longer term, and is the transition from an externally supported to a self-sustaining basis adequately thought through?
5. How well does the SNEI take into account specific regional/local conditions and needs – physical, infrastructural, economic and political – and the social and cultural characteristics of its communities, and how well is it tailored to these?
6. In particular, is the SNEI based on a sound assessment of the skills, expertise, knowledge and other resources of the parties involved, particularly local authorities?
7. How well, effectively and widely do the SNEI, and the activities it is designed to stimulate or coordinate, draw on the skills, expertise, knowledge and other resources in the locality/region – for example, in higher and technical education organisations, in community groups and NGOs, in business associations, in local authorities, and among individual energy users? To what extent is it dependent on resources from outside the region and vulnerable to interruptions or quality changes in their supply?
8. Does the SNEI make full and clever use of available regional, national and European support in the form of research, information, advice, finance and expertise? Does it identify and pursue suitable support where that is not currently available?
9. Is the SNEI resilient and robust in the face of other possible challenges or setbacks, particularly market, organizational and governance changes in the

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

energy sector? Does it rely inappropriately on the success or continued cooperation of other initiatives, or on the continued support of other agencies? Does it have sufficient support for its long-term goals across the political spectrum to survive changes of elected representatives and administrations?

10. To what extent does the SNEI rely on the sustained commitment or enthusiasm of participants, particularly those not being rewarded financially for their involvement? How does it seek to maintain that, and how will it respond to a decline in their commitment?
11. How durable will be the changes in technology, practice and organisation in energy provision it is designed to bring about? In particular, how durable will be any networks, cooperation or business ventures it sets up?
12. Has the SNEI made an adequate sensitivity analysis to take into account the effect on its operation and success of changes in external conditions, such as energy prices and resource availability?
13. How effective and how easy are the delivery or implementation of the instruments used in the SNEI?²³ How cost-effective are the analyses and instruments used? In particular, to what extent does the SNEI make use of existing and easily available information for planning and evaluation, or require new data and analysis?
14. How consistent are the objectives and activities of the SNEI with other energy strategies and objectives, and with those in related policy domains such as transport and built environment? Does any planning procedure in the SNEI sit comfortably with other planning procedures – for example, in land use or waste management planning – that it must be coordinated with? Does the SNEI avoid adding complexity or contradictory signals or burdens on the activities it is designed to stimulate or coordinate?
15. Is the SNEI consistent, and how well where appropriate is it coordinated, with regional development and other initiatives and strategies in its region, and with energy initiatives in neighbouring regions?
16. Does the SNEI identify and effectively pursue the changes in external institutions that are needed or would be helpful for its success – such as governance processes, support mechanisms, finance structures, education and training provision?
17. Does the SNEI have a strategy for dealing with changes in the context of the energy sector in the region, country or Europe – for example in the energy industry structure and markets, in renewables or energy efficiency targets, in carbon markets and other governance instruments?
18. To what extent and how well does the SNEI acknowledge and take into account diverse interests, objectives, practices and conditions of energy use in the region/locality – and not inappropriately assume uniformity?

²³ It is not necessarily best to have changes that are easily implemented; the point of an initiative maybe to be disruptive or to demonstrate the possibility of radical change.

19. To what extent and how well does the SNEI allow for and encourage appropriate distinctiveness and differentiation of the region/locality from others and within the region/locality?
20. Where an SNEI is based on changing use practices, does it acknowledge the influences on current use practices and the difficulties of achieving such change?
21. Where an SNEI is intended to stimulate or support innovation in energy technologies, is it based on a sound understanding of innovation processes and systems in the region or the sector, their strengths and weaknesses, and the need for local capacities and resources?
22. Where an SNEI supports or encourages energy systems that must grow over time – especially network-based systems like large-scale district heating – are its activities on an appropriate timescale, and suitably synchronised with that growth?
23. Where an SNEI is intended to stimulate or support the growth of local energy industries, is it based on a sound understanding of the role of these industries, existing local capacities and their strengths and weaknesses?
24. Where a SNEI involves drawing lessons from existing local installations of renewables or efficiency measures and disseminating them, how well does it do so, and how effective is it in applying those lessons elsewhere, stimulating replication of successful projects, or avoiding the pitfalls it identifies?

4.1.4 Planning approach

1. To what extent does the SNEI help develop and embed a systematic, informed approach to energy planning in regional/local authorities
2. Does the SNEI provide the required knowledge base, tools, techniques, and opportunities for involvement, for all parties involved?
3. In particular, does the SNEI provide, or at least point to, useful and clear guidance and tools for the planning and evaluation of the activities themselves – on, for example, investment appraisal, value chains, management practices, negotiation procedures, mapping and monitoring, and business models and plans – and a sufficiently comprehensive range of these?
4. Where the SNEI has a tangible output in the form of a document, tool or technique for strategy, planning or evaluation, how useful and usable is that?

4.1.5 Organisation, roles, resources and governance

1. Does the SNEI have an appropriate organisational form? How comprehensively does the SNEI identify the parties needed for the initiative? How appropriately does it allocate roles, responsibilities and relations?

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

2. How well does the SNEI identify the technical and managerial skills needed for its implementation, and provide for the development of these where they are not adequate?
3. To what extent and how well does the SNEI encourage good governance in the activities it is designed to stimulate or coordinate
 - effective coordination
 - good cooperation or integration
 - leadership
 - participation
 - transparency
 - accountability
 - community ownership and control
 - clarity of roles and responsibilities?
4. Does the SNEI itself display good governance in these respects, including offering participants choice and involvement in how the initiative is governed?
5. Does the SNEI offer and encourage a wider role for energy users than their traditional one as retail customers and consumers of delivered energy forms?

4.1.6 Evaluation, learning and dissemination

1. Does the SNEI have clear goals? Are they defined so that it will be clear whether and when they have been achieved?
2. How appropriately and thoroughly does the SNEI evaluate its own achievements and impacts? In particular, how well does it take into account and treat together the environmental, economic and other social costs and benefits of both levels of activity?
3. How well does the SNEI explain its vision and goals, and the values on which it is based, in a convincing way for the parties involved? How well does it encourage the parties involved to articulate and consider their visions and goals?
4. Where the SNEI involves analysing and drawing lessons from existing initiatives, how well does it do this? Does it derive lessons at an appropriate level, and take into account differences in characteristics and conditions?
5. How appropriately and thoroughly does the SNEI evaluate the activities it is designed to stimulate or coordinate? Has the SNEI chosen appropriate criteria and indicators for the evaluation of the activities it stimulates or coordinates – for example, if it sets standards for accepting activities or makes awards among competing activities? In particular,
 - does it use appropriate forms of full system or life-cycle analysis [2.24]?
 - does it consider positive and negative effects beyond the geographical boundaries of the locality/region [2.25]?
 - does it evaluate effects on an appropriate time-scale [2.26]?

- does it compare performance against appropriate benchmarks or baselines [3.15-3.19]?
 - does it use adequate forms of prediction of future conditions [3.163.17]?
 - does it use appropriately, and justify, measures of effect, effort and efficiency [3.19]?
 - how well does it attempt to trade off local impacts against wider benefits [3.7]?
6. How well does the SNEI publicise and communicate its own achievements and experience, both to those involved – particularly to keep them motivated – and outside – particularly to funding bodies? How tangible and visible are its local/regional benefits, and what does the SNEI do to make them more so?
 7. How well do the SNEI, and the activities it is designed to stimulate or coordinate, contribute to goals of developing understanding of energy issues and their importance, and of encouraging improvements, through
 - awareness-raising
 - education
 - inspiration
 - commitment
 - demonstration of good practice
 - communication among parties?
 8. How well does the SNEI encourage the transfer of lessons and the replication of its successes more widely?
 9. How well does the SNEI build into its activities, and encourage in the activities it is designed to stimulate or coordinate, features that encourage social learning:
 - flexibility and adaptability in technologies and organisation
 - mechanisms for continuous evaluation and feedback, and particularly mechanisms and measures for early or timely detection of positive and negative impacts
 - stimulation of and scope for locally appropriate initiative, experimentation, innovation and demonstration
 - an organisational culture that tolerates mistakes or failures, and learns from them
 - systematic attempts to anticipate technological or social change that will affect the initiative
 - ability to accommodate or respond to unforeseen technological or social change

4.1.7 Private economic objectives: ex ante

1. What are the expected direct costs to the organisation by year and by category, before, for the duration of, and after the initiative?

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

2. What is the expected income to the organisation by year for the duration of the project from its clients?
 - from subsidies and other sources?
3. What, under stated discount rates, is the net present value of the initiative to the organisation?
4. What is the range of uncertainty in key variables, and how sensitive are the results to variations in these? In particular, what uncertainty is attached to the estimates of probabilities and consequences of possible future events that affect the costs and income?
5. Is the expected value of net income in any one year, and the net present value if calculated, acceptable to the organisation? Is the point at which the value becomes unacceptable outside a reasonable range of variation in uncertain variables?
6. What are the intangible costs and benefits of the SNEI to the organisation? Can these reasonably be quantified? Do these apply evenly or unevenly to the partners in the organisation? Are they considered significant compared to the financial costs and benefits?

4.1.8 Private economic objectives: ex post

1. What were the direct costs to the organisation by year and by category, before the initiative and to this point?
2. What was the income to the organisation by year to this point
 - from its clients?
 - from subsidies and other sources?
3. What does the pattern of costs and income over time indicate about their variability?
4. What were the intangible costs and benefits of the SNEI to the organisation, and how were these judged in practice? Did these apply evenly or unevenly to the partners in the organisation? Are they considered significant compared to the financial costs and benefits?
5. How well did the actual volume of activity, and cost and income streams, correspond to the ex ante evaluation? Was any variation within the bounds of the uncertainty analysis?
6. Are there evident reasons for any variation from the predicted performance? To what extent was the performance affected by factors internal to the organisation and initiative, by factors in the external environment which the organisation might have been able to influence, and by factors in the external environment beyond the control of the organisation?

4.1.9 Public economic objectives: ex ante

1. What additional inputs will be required from the region to the SNEI, from private sources through taxation or from public sources, what will they cost, and what will the pattern of those costs be over time?
2. What changes in business and residential energy and other costs will be directly attributable to the SNEI?
3. To what extent will the SNEI help overcome inhibitive costs structures of installation/adoption?
4. What additional central government provided resources will the SNEI secure for the region?

4.1.10 Public economic objectives: ex post

1. What additional inputs were required from the region to the SNEI, from private sources through taxation or from public sources, what did they cost, and what was the pattern of those costs over time?
2. What changes in business and residential energy and other costs can be directly attributed to the SNEI?
3. To what extent did the SNEI help overcome inhibitive costs structures of installation/adoption?
4. What additional central government provided resources did the SNEI secure for the region? Did the SNEI secure all such available support?
5. Are there evident reasons for any variation from the predicted performance? For any effects that were predicted and did not eventuate, were there contingent and exceptional circumstances that prevented them from being realised?

4.1.11 Regional development objectives: ex ante

1. Is the SNEI consistent with the goals of existing development strategies in the region?
2. What change in the character and level of industrial and commercial activity and output in the region will be directly or indirectly attributable to the SNEI, and at what times during and after the initiative?
3. In particular, what will the SNEI contribute
 - to bringing high value parts of energy supply chains into the region or retaining them in the region?
 - to increased sourcing of energy forms and services from within the region?
 - to retaining income from energy activities in the region?
4. Will the SNEI contribute to the initiation or growth of energy industry clusters, including locally sited support services? What will it contribute to the development of a regional energy innovation system?

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

5. What changes in the character and level of employment in the region will be directly or indirectly attributable to the SNEI, and at what times during and after the initiative?
6. What technological change will be supported or stimulated in existing industries in the region?
7. What will the SNEI contribute to the resilience of the region's industrial base, particularly through diversification?
8. To what extent and how will the SNEI raise the profile of energy issues in the region?
9. What wider adoption will take place of the practices and technologies to be developed or used in the SNEI?
10. What will be the less tangible costs and benefits of the SNEI to the region, including improvement of the natural and built environments, and increases in its vitality and attractiveness? Can these reasonably be quantified? Do these apply evenly or unevenly to localities and to social groups in the region? Are they considered significant compared to the quantifiable costs and benefits?

4.1.12 Regional development objectives: ex post

1. What change in the character and level of industrial and commercial activity and output in the region can be directly or indirectly attributed to the SNEI, and at what times? In particular, what has the SNEI contributed
 - to bringing high value parts of energy supply chains into the region or retaining them in the region?
 - to increased sourcing of energy forms and services from within the region?
 - to retaining income from energy activities in the region?
2. What changes in the character and level of employment in the region can be directly or indirectly attributed to the SNEI, and at what times?
3. In what ways has the SNEI contributed to the resilience of the region's industrial base, particularly through diversification?
4. To what extent and how did the SNEI raise the profile of energy issues in the region?
5. What wider adoption took place of the practices and technologies developed or used in the SNEI?
6. What technological change was supported or stimulated in existing industries in the region?
7. What less tangible costs and benefits of the SNEI to the region can be observed, including improvement of the natural and built environments, and increases in its vitality and attractiveness? Can these reasonably be quantified? Did these apply evenly or unevenly to localities and to social groups in the

region? Are they considered significant compared to the quantifiable costs and benefits?

8. Are there evident reasons for any variation from the predicted impacts on the region? For any effects that were predicted and did not eventuate, were there contingent and exceptional circumstances that prevented them from being realised?
9. Has the SNEI contributed to improving development strategy processes or planning processes in the region, particularly by strengthening or devolving policy-making capabilities, or had other beneficial effects on regional governance?

4.2 Evaluative questions for activities supported or coordinated by a SNEI (set II)

4.2.1 Energy efficiency

1. How much does the activity reduce demand for energy services or delivered energy forms?
2. How much does the activity increase efficiency of energy production and/or use, particularly where energy provision continues to rely on fossil fuels?
3. Among the options for achieving its objectives, does the activity encourage the take-up of the most cost-effective, the lowest cost, or those with the highest benefit/cost ratio?

4.2.2 Move away from fossil fuels to renewables

1. How much does the activity decrease use of and reliance on fossil fuels – for example, by directly displacing them or by reducing the need for fossil-fired capacity as back-up?
2. How much does the activity increase the uptake of renewable technologies or the amount of electricity or heat obtained from renewable sources?
3. Does the activity involve or encourage the adoption of renewable energy technology on appropriate scales?
4. Does the activity improve the operation of existing renewables installations – for example, by providing more continuous supply to the region?

4.2.3 Environmental impact

1. What physical resources other than energy (land, water, materials) does the activity require, taken over the whole system and for its full life-cycle?
2. Does the activity reduce overall environmental impact, including overall greenhouse gas emissions, taken over the whole system and for its full life-cycle?

WP 5.2 Documentation of effects and elaborating criteria 6th of March 2013

3. What additional impacts on, and disruptions of, local natural processes and conditions does the activity create, taken over the whole system and for its full life-cycle? Are any of these impacts overwhelming, irreversible or locally concentrated to an unacceptable extent?
4. In particular, can renewable energy and other resource flows in the locality/region or in any outside area that the activity relies on, cope with these additional demands – with regard to geographical, seasonal and longer-term fluctuations in them, and other pressures on them?
5. Where an activity redistributes environmental impacts and especially where it imposes new impacts on the locality/region, are the local impacts adequately managed, and are the trade-offs between local and wider impacts appropriate, acceptable and adequately justified?

4.2.4 Move to local/regional energy provision and integration

1. To what extent does the activity contribute to the local integration of energy provision, particularly through
 - coterminous production and consumption of energy
 - stimulating appropriate use patterns to match local supply, or supplies that can match local needs
 - matching quality of supply and use
 - anticipating and accommodating short-term and seasonal variability in supplies, especially from renewable sources
 - reuse or cascading of heat
2. To what extent does the activity draw into the region/locality, or retain in the region/locality, elements of the energy chain?
3. What benefits does this localisation and integration of elements of the chain provide in terms of energy efficiency, economies of scale, economies of scope, or reductions in transport and transmission and associated energy losses and environmental damage?
4. Does the activity contribute to enhanced security or reliability of regional energy supply, especially through
 - increased diversity of source;
 - reduction in reliance on resources from outside;
 - reduction in the impact of interruptions to supply;
 - enhanced matching of supply and demand, smoothing of demand, or reduced intermittency of supply?

4.2.5 Strategy

1. Where necessary, does the activity have a sound business plan and business model?

2. Does the activity fit well where necessary with current energy industries and markets? Where it envisages developing an alternative to them or local independence from them is that arrangement realistic and adequately understood?
3. If the activity has to be sustained, how durable is it? How robust is it to changes in the context of the energy sector in the region, country or Europe? Can it adapt to changes in targets and regulatory requirements?
4. How well does the activity handle the sustainability objectives coming from the SNEI along with its other objectives and other pressures on it?
5. How well does it maintain the sustainability objectives where they conflict with others?
6. How well have the parties involved in the activity taken on the systematic approach to planning developed by the SNEI, and how firmly is it bedded in their practice? How well have they taken up and used the tools and techniques provided by the SNEI?

4.2.6 Equity and other social objectives

1. Does the activity where appropriate take into account geographical and social variation among energy users in
 - affordability of energy services;
 - access to energy supplies and equipment;
 - awareness and understanding of energy issues and options;
 - cultural practices, values and meanings;
 - environmental impacts of energy options?

especially in its spatial and population mapping of current energy provision and energy needs and its selection of beneficiaries and targeting of work.

2. Does the activity where appropriate consider the geographical and social distribution of its costs and benefits?
3. In particular, does the activity take into account differences in its costs and benefits by gender and by ethnic or cultural identity, particularly in its implications for working patterns and divisions of labour within and outside the home or workplace? Does it adequately consider who pays for energy services and carries out work involved in energy provision in the home or workplace?
4. What does the activity contribute to the goals of improving intra- and inter-generational equity and other distributional or environmental justice issues? In particular, what does it contribute to alleviating energy poverty?
5. To what extent and how well does the activity protect the interests of energy users as consumers and citizens – for example, by avoiding monopoly supply, maintaining appropriate competition, and providing grievance procedures?
6. How well are health and safety treated in the activity?
7. To what extent does the activity increase local/regional social capital in the form of

- social cohesion
- skills and capacities
- creativity
- sustained networks
- effective and durable organisation
- cooperation and participation
- appropriate cultural shifts and changes in practice
- robust understandings and values?

4.2.7 Governance

1. How well does the activity deploy or enhance technical and management skills, expertise and knowledge, including local knowledge of physical and social conditions?
2. Does the activity display good governance:
 - effective coordination
 - good cooperation among parties and integration between activities
 - transparency
 - accountability
 - clarity of roles and responsibilities?
3. Does the activity provide or enhance local and democratic involvement in and control over energy provision, including appropriate consultative and participatory decision-making, and ownership or shareholding?

4.2.8 Evaluation, learning and dissemination

1. How appropriately and thoroughly does the activity evaluate its own impacts?
2. How well does the activity meet not only the standards set for it by the SNEI (selected from the preceding questions) but also any relevant sustainability criteria set by other authorities?
3. How well does the activity publicise and communicate its own achievements and experience, and its relation to the SNEI?
4. What does the activity contribute to the transfer of lessons among participants in the SNEI and other relevant parties in the locality/region?
5. How well do the activity contribute to goals of developing a wider understanding of energy issues and their importance, and of encouraging improvements, through
 - awareness-raising
 - education
 - inspiration
 - demonstration of good practice
 - communication among parties?

4.2.9 Private economic objectives: ex ante

1. What net financial gain does the participant anticipate making from its participation in the SNEI?
2. What intangible costs and benefits does the participant anticipate incurring from its participation in the SNEI?

4.2.10 Private economic objectives: ex post

1. What net financial gain did the participant make, or claim, from its participation in the SNEI?
2. What intangible costs and benefits did the participant incur, or claim, from its participation in the SNEI?
3. Did the SNEI lead the participant to extend its activities or market beyond the region?

4.2.11 Public and regional economic objectives: ex ante

1. In what ways will the activity of the participant contribute to diversity in the regional economy? In what ways will the activity of the participant contribute to regional and national efforts to move the energy sector towards sustainability?
2. What will the requirements of the participant be for additional or different labour in specific occupations as a result of its involvement in the SNEI?
3. What new forms, or increased level, of knowledge exchange, networking or external cooperation will the participant undertake as a result of its involvement in the SNEI?

4.2.12 Public and regional economic objectives: ex post

1. In what ways did the activity of the participant contribute to diversity in the regional economy?
2. In what ways did the activity of the participant contribute to regional and national efforts to move the energy sector towards sustainability?
3. What changes occurred in the labour force of the participant and of other organisations in the region as a result of its involvement in the SNEI?
4. What new forms, or increased level, of knowledge exchange, networking or external cooperation did the participant undertake as a result of its involvement in the SNEI?