BRITISH LOCAL GOVERNMENT POLICIES ON LANDSCAPE, RENEWABLES AND WIND FARMS

Dr. Andrew Lothian, Scenic Solutions

February, 2021

Cover photographs
Red Tile wind farm, England
North of Preston, England
Dunlaw wind farm, Scotland

British local government policies on landscape, renewables and wind farms

Scenic Solutions
39B Marion Street,
Unley, South Australia, 5061
AUSTRALIA

E: lothian.andrew@gmail.com
I: www.scenicsolutions.world
M: (61) 439 872 226

CONTENTS

Wind turbines are amongst the most controversial types of development that local planning authorities deal with. (Gedling Borough Council, 2018)

EXECUTIVE SUMMARY

This paper reports on a study of the extent to which councils in Britain have assessed the landscapes in their areas and have developed policies covering renewables and in particular, wind farms, and their relationship to the landscape. It commences with a review of UK Government policy on renewables and wind energy.

Over the past decades, the UK Government has set targets for renewables but has rarely achieved them. In 2016 it assigned responsibility of for assessing wind farm applications to local government. Possibly in response, applications for wind projects have fallen drastically, aided also by the removal of subsidies.

There are 347 councils in England, a further 22 in Wales and 33 in Scotland, making a total of 402. This study examined their websites and reports on landscape and renewables/wind. Nearly 400 reports were reviewed, the Welsh and Scottish councils focusing more on renewables whereas the English councils focused more on the landscape.

Rather than measure why one landscape is better than another, the character of the landscape, how they differ from each other, is assessed. This accords with the European Landscape Convention (ELC), which the UK had a strong influence in framing, and which defines landscape by its character, not value. 165 landscape character assessments have been prepared, mostly in England. The reports comprehensively describe the area and divided into areas of similar character and then describe the actions needed to retain its character. Reviews have found they are largely prepared by professionals with little cognizance of the landscapes' diversity and inherent conflicts. Some councils have described the landscape more broadly and, in Wales and Scotland, emphasised landscape quality to a greater extent than in England. Mainly English councils also assessed the landscape capacity and sensitivity to development.

In Britain, 50 SDPs or SGPs were prepared to guide Council's planning policies. Most focussed on wind energy. Nearly 40 factors have been identified by councils regarding the impact of wind farms on landscape character and quality. Issues include the separation distance between housing and turbines, repowering of turbines, the motion of turbines and their effect on countryside tranquillity, cumulative impacts, and developments in the Green Belt. A review by one council of existing wind farms found they had a significant and increasing landscape impact.

Over 50 reports examined the sensitivity and capacity of the landscape for wind farms rating these from low to high sensitivity; a highly sensitive landscape has low capacity for wind farms and vice versa.

Overall, the twin issues of landscape and renewables are very significant among Britain's councils and a great deal of work and research has been expended to survey them and assess the potential for renewables, particularly wind farms. A greater public input into these reports would lessen their reliance on landscape professionals. Improved consistency in the factors to be assessed and in defining separation distances is needed. The effect of the motion of turbines on countryside peace and tranquillity is significant and should be assessed.

INTRODUCTION AND PURPOSE

The accelerated use of renewable energy is widely regarded by governments as the answer to climate change, through gaining energy without the greenhouse gases associated with fossil fuels.

The United Kingdom has attempted to ride the renewables wagon with mixed success. As this paper shows, its targets for renewables and greenhouse gas reduction have been jumbled and have generally failed to be achieved. And the use of wind energy, one of the most effective of renewable energies, has encountered growing opposition by the UK populace principally because of their visual impact on the landscape.

Until 2016, the central UK Government had authority to consider applications for wind farms, but since then, local planning authorities have had the power to assess onshore wind farm applications throughout the United Kingdom.

The paper addresses wind farms in Britain which comprises England, Wales and Scotland but excludes those in Northern Ireland. It reports on the extent to which councils in Britain have assessed the landscapes in their areas and have developed policies covering renewables and in particular, wind farms and their relationship to the landscape. It commences with a summary of the development of UK Government policies to advance renewable energy.

UK GOVERNMENT POLICY ON RENEWABLES AND WIND ENERGY

From 1990 the Non-Fossil Fuel Obligation (NFFO) operated in the United Kingdom requiring electricity operators to purchase electricity from nuclear and renewable energy sources. The NFFO was replaced in 2002 by the Renewables Obligation (RO) which required electricity suppliers to purchase an increasing proportion of electricity from renewable sources, rising from 3% initially to 40.9% by 2018. Recognising that some renewables were better able to come on stream than others, a review in 2007 led, in 2009, to vary the level of support of technologies depending on their capacity to be utilised. Further reviews led to the tariff for onshore wind being reduced for the 2013 -17 period and raised for wave and tidal projects. The RO ceased in 2016.

From the early 2000s, the energy policy of the UK has been driven largely by the climate change issue and the need to reduce greenhouse gas emissions from energy production. In 2003 the Government issued the White Paper on Energy: *Our Energy Future – creating a Low Carbon Economy* committing to a 60% reduction in carbon dioxide emissions by 2050. The *Energy Review* of progress in 2006 identified the two challenges - to address climate change and also to obtain clean energy at affordable prices. The *Energy Review* proposed a number of measures, including emission trading, to hasten progress. This was followed by the 2007 Energy White Paper: *Meeting the Energy Challenge* which proposed legally binding carbon targets and economy-wide measures to contain emissions. Renewables were targeted to supply 10% of electricity by 2010 and an “aspiration” to achieve 20% by 2020 to meet the European Union target.

In October, 2008, the Labor Government introduced the *Climate Change Act* which aimed to reduce the six Kyoto greenhouse gases[1] by 80% by 2050 compared with the 1990 base, thus expanding from just carbon dioxide to cover all greenhouse gases, while lifting the target from 60% to 80%. An interim target of 26% by 2020 was set. The 2009 EU Renewable

1. Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6).

Energy Directive targeted the UK to achieve 15% of its total energy from renewables by 2020, compared with only 1.5% in 2005. The report noted that the:

> "UK has substantial renewable energy resources, for example the British Isles have 40% of Europe's wind and some of the highest tidal reaches in the world." and that "onshore wind is the most well-established and currently the most economically viable source of renewable electricity available for future large-scale deployment in the UK."

In July, 2011, the Conservative–Liberal Democrat Government published a series of National Policy Statements on energy covering fossil fuel, renewables, gas, oil and nuclear. The Overarching National Policy Statement for Energy (EN-1) reiterated the commitment under the Climate Change Act, 2008 to the legally binding target. The EN-1 policy stated in respect of wind energy:

> "Landscape effects depend on the existing character of the local landscape, its current quality, how highly it is valued and its capacity to accommodate change. All of these factors need to be considered in judging the impact of a project on landscape. Virtually all nationally significant energy infrastructure projects will have effects on the landscape."

These provisions covered England and Wales, with Scotland and Northern Ireland having devolved powers for energy policy.

The National Policy Statement for Renewable Energy Infrastructure (EN-3) covered onshore wind projects of over 50 MW – 20 turbines of 2.5 MW each. It also covered biomass and waste combustion, and offshore wind energy. The policy provided guidance for these projects. For onshore wind farms, it covered repowering of sites where fewer but larger new turbines replace many older smaller turbines. It established the principle that wind farms should not be located in nationally significant sites such as National Parks, AONBs and Sites of Special Scientific Interest except where they are not compromised by the wind farm. Regarding the landscape impacts, the policy stated:

> "The arrangement of wind turbines should be carefully designed within a site to minimise effects on the landscape and visual amenity while meeting technical and operational siting requirements and other constraints."

Paralleling these measures, the Government passed the Localism Act, 2011 which devolved decision-making powers from the central government to individuals and communities. It increased local government's "general power of competence" and provided that "A local authority has power to do anything that individuals generally may do". However the central Government retained the power to decide wind energy projects. Under the Localism Act, Neighbourhood Plans were introduced to be prepared by town and parish councils and in accord with national planning policy. They become part of the Statutory Development Plan for the area.

The National Planning Policy Framework (NPPF) originally issued in 2012, revised in 2018 and again in 2019, provided the framework for the preparation of local plans for housing and other developments. The planning system aims to achieve sustainable development and involves the integration of economic, social and environmental objectives. Plans produced at the local level need to provide a positive vision for the area, address housing, economic, social and environmental needs, and allow the community to shape their surroundings. Developments are to be assessed in accordance with the development plan.

The NPPF required plans to support the transition to a low carbon future and identify suitable areas for renewable energy including decentralised energy systems. Such systems should be approved if their impacts are acceptable, are located in an area identified in the

development plan as suitable for wind energy, and that its impacts on the local community have been addressed and it has their backing.

On 18th June, 2015 the Government issued the following Ministerial statement relating to the development of wind turbines:

> "When determining planning applications for wind energy development involving one or more wind turbines, local planning authorities should only grant planning permission if:
>
> - The development site is in an area identified as suitable for wind energy development in a Local or Neighbourhood Plan;
> - And following consultation, it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing.
>
> "In applying these new considerations, suitable areas for wind energy development will need to have been allocated clearly in a Local or Neighbourhood Plan. Maps showing the wind resource as favourable to wind turbines, or similar, will not be sufficient. Whether a proposal has the backing of the affected local community is a planning judgement for the local planning authority."

This intent became law through the Energy Act, 2016 where all decisions for onshore wind energy were given to local authorities (S 78 – 81). Some have questioned whether these provisions run counter to the supportive tone of the NPPF for wind energy development (e.g. Harrogate Borough Council, 2018) and could enable, after all the objective assessments of the NPPF has been fulfilled, the local community to veto the development.

Concurrently with the Ministerial statement, the Government issued the *Guidance on Renewable and Low Carbon Energy* to assist local councils in the development of policies. The Guidance stated that the need for renewable energy does not automatically override environmental protections and that the protection of local amenity was an important consideration. In respect of landscape, the Guidance stated:

- Cumulative impacts require particular attention, especially the increasing impact that wind turbines … can have on landscape and local amenity as the number of turbines … in an area increases;
- Local topography is an important factor in assessing whether wind turbines … could have a damaging effect on landscape and recognise that the impact can be as great in predominately flat landscapes as in hilly or mountainous areas;
- Proposals in National Parks and Areas of Outstanding Natural Beauty, and in areas close to them where there could be an adverse impact on the protected area, will need careful consideration;

In considering landscape impact, factors include establishing the zones of visual influence including cumulative visual influence, key viewpoints, identifying people who may experience the views, consideration of the sequential views obtained by driving, cycling or walking through the area, and the landscape character. No qualitative assessment of visual impact was suggested.

Applicants are required to undertake compulsory pre-application consultation with the local community, enabling them to comment on the proposal and consider any comments received. The requirements are spelt out in the Town and Country Planning Act 1990, Section 61W. The requirement for the backing of the local community for wind energy developments is not intended to provide a veto of proposals; all have to be considered on their merits.

Cowell & Devine-Wright (2018) however consider that it provides local communities with a veto to stop wind farms. The industry body, RenewableUK, was unaware of any council who had identified suitable areas for wind farms (Tilley, 2015). The Chair of the Planning Officers Society, Michael Wilks, suggested that rather than identify suitable areas for wind farms, councils could make wind development acceptable across their entire area subject to specified criteria (Tilley, 2015). The National Planning Practice Guidance indicated that providing the criteria are positive, such an approach can be useful. The Planning Officers Society also suggested that it would be politically contentious to identify sites for wind energy in the local plan (Smith, 2016). However a report in June 2016 indicated that four councils – Hull, Eden, Torridge and North Devon – had drawn up draft policies to allocate areas for wind energy (Sell & Carpenter, 2016). The Centre for Sustainable Energy (nd) published guidance on identifying suitable areas for wind developments.

From 2013 subsidies for wind energy were increased from £1,000 per megawatt (MW) per year of the wind farm's life to £5,000/MW/an. However, they were phased out in 2016 but reintroduce in 2020 in an effort to reduce the country's greenhouse gas emissions (*The Guardian*, 2/3/20).

In 2009, the EU Renewables Directive required 15% of total energy use by 2020 to come from renewables but by 2019 the figure was only 11% (www.edie.net). In 2019, 37% of UK's electricity was generated by renewables. In October, 2020, the UK set a target of reaching net zero greenhouse emissions by 2050 which would require a massive investment in renewables and other non-emitting technologies. (www.gov.uk). In September, 2017, the Welsh Assembly aimed to generate 70% of its electricity consumption from renewable energy by 2030 and to achieve 100% by 2035 (www.renewableenergyhub.co.uk). In 2018, 21% of total Scottish energy consumption came from renewable sources, mostly from wind. By 2030, Scotland aims to generate 50% of its total energy from renewable sources and 100% by 2050 (Scottish Government, 2017a, www.gov.scot).

Table 1 summarises the jumble of targets that the UK has promulgated over the past two decades, few of which have been achieved.

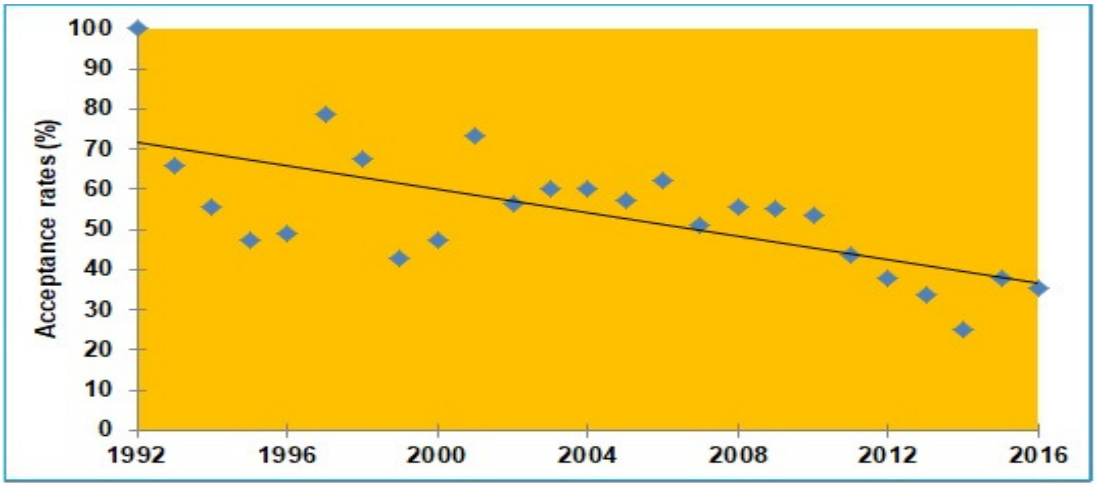
Table 1 UK Energy targets

Year	Total energy	Electricity	GHG
2003			60% reduction in CO_2 by 2050.
2007		Renewables 10% electricity by 2010 & 20% by 2020.	
2008			80% reduction in GHG by 2050. Interim 26% by 2020.
2009	15% total energy from renewables by 2020. Actual 1.5% in 2005, 11% in 2019.		
2019		Actual 37% electricity from renewables.	
2020			0% GHG emissions by 2050.

GHG =Greenhouse gases

Successful applications for onshore wind farms have fallen steadily since 2012 from over 70% to 40% in 2014 (House of Lords, PQ, 22 July 2014). In June, 2015, the month that the new planning requirements were implemented, there were 133 planning applications for onshore wind but by 2017 there were only 52 for the entire year (Harper *et al*, 2019). Figure 1 shows the steady decrease in the acceptance rate of onshore wind farms in Britain. Over the period 1991 to 2017 approvals of onshore wind farms averaged only 44%, the lowest of

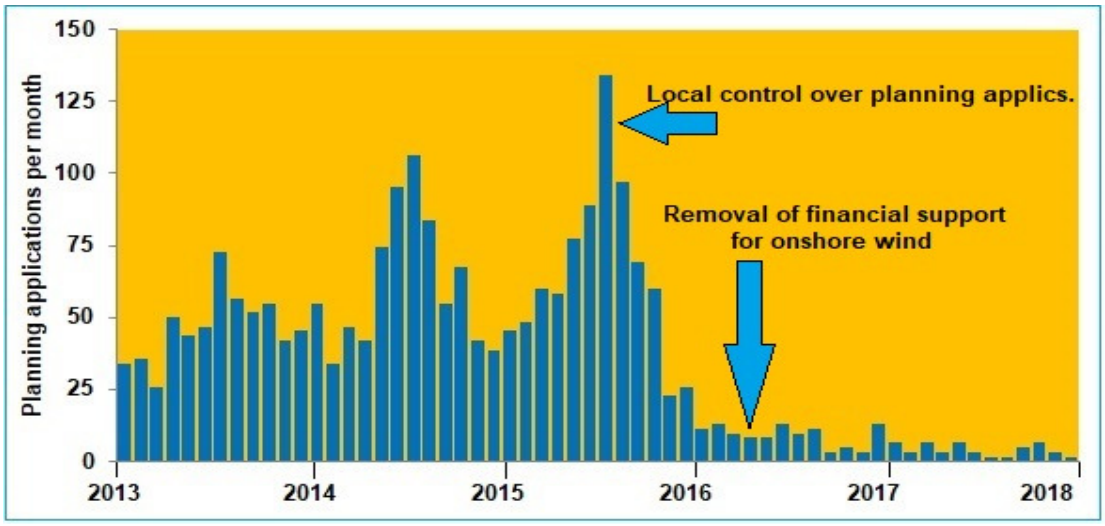
any renewable energy technology (ibid). The size of the project, local demographics and proximity to existing wind farms were key factors influencing approval of new projects.



Harper et al, 2019

Figure 1 Annual acceptance rates of wind energy projects, Great Britain, 1992 – 2016

Figure 2 displays the influence of the decisions in 2015 and 2016 to place planning applications for wind farms in the hands of local councils, and to remove financial support.



Harper et al, 2019

Figure 2 Planning applications per month

SOURCE OF DATA

There are 347 councils in England, a further 22 in Wales and 33 in Scotland, making a total of 402. While the councils in Wales and Scotland are single tier or unitary councils, those in England are divided between metropolitan districts (36), unitary authorities (55 plus Isles of Scilly), county councils (26), district and borough councils (196), and London Boroughs (32 plus City of London). County councils have up to 14 district or borough councils within their borders and these local councils are usually responsible for assessing wind farm applications.

Around 370 council websites were examined in detail to locate relevant reports and policies. Reports and policies were classified into the following six categories:

Landscape
- Landscape character assessments
- Landscape reports and strategies
- Landscape sensitivity and capacity

Renewables/wind
- Renewables/wind energy Supplementary Planning Document (SPD) or Supplementary Planning Guidance (SPG)
- Landscape sensitivity to and capacity for wind energy projects
- Renewables/wind energy/low carbon strategies and studies

Table 2 summarises the number of reports and policies in the two broad categories, landscape and renewables. An interesting finding from Table 1 is that in Wales and Scotland the emphasis was on studies of renewables rather than the landscape, but in England this was reversed with far more reports on the landscape than on renewables and wind energy.

Table 2 Number of landscape and renewables reports and policies in Britain

Country	Landscape	Renewables/wind	Total
England	186	110	296
Wales	8	23	31
Scotland	28	39	67
Total Britain	222	172	394
England	62.84%	37.16%	100%
Wales	25.81%	74.19%	100%
Scotland	41.79%	58.21%	100%
Total Britain	56.35%	43.65%	100%
England	83.78%	63.95%	
Wales	3.60%	13.37%	
Scotland	12.61%	22.67%	
Total Britain	100.00%	100.00%	

Figure 3 illustrates the number of studies in England, Wales and Scotland and shows that in absolute terms, far more studies have been carried out in England than in the other two jurisdictions.

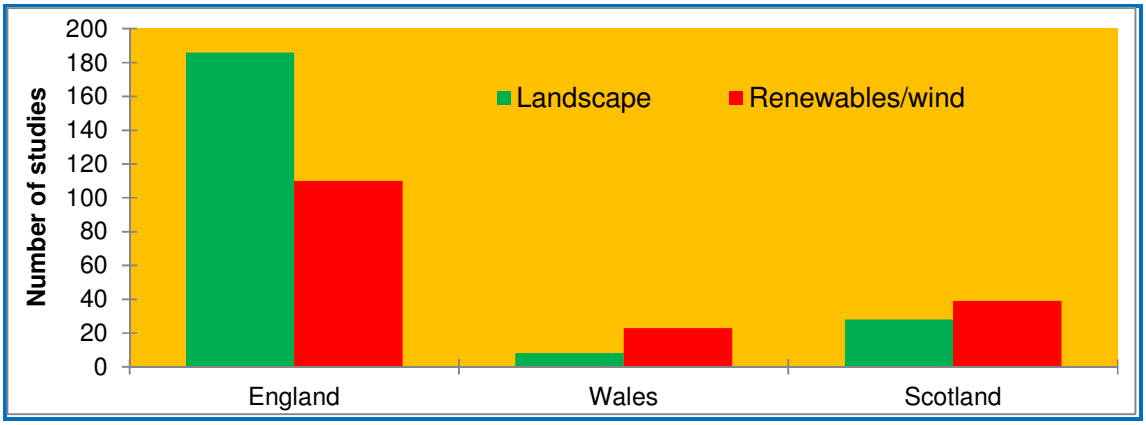


Figure 3 Number of studies in England, Wales & Scotland

Table 3 summarises the number of councils that have prepared reports and policies on landscapes and renewables. English councils prepared 186 landscape studies and 110 studies on renewables and wind energy. In Wales the figures are 8 on landscape and 23 renewables while in Scotland they are 28 on landscape and 39 on renewables. Some councils have prepared multiple reports on these subjects. Compared with the number of councils, the Scottish councils have been the most active with 33 councils preparing 67

reports and policies on landscape and renewables, followed by the Welsh councils where 22 councils prepared 31 reports. English councils have been less active with 296 reports from 313 councils.

Table 3 Number of councils with landscape and renewables reports and policies

	Number of councils*	Landscape	Renewables/wind
England			
County Councils	28	16	12
District councils	161	101	60
Unitary councils	35	23	12
Metropolitan districts	72	46	26
Total England	296	186	110
Wales	22	8	23
Scotland	33	28	39
Total Britain	401	222	172

* Excludes 33 London boroughs. Note that with the shift towards unitary councils, the numbers of councils are constantly changing. The number of councils shown here is at November, 2020.

Drilling down into the types of studies (Table 4) shows the dominance of landscape character assessments and studies of renewables/wind/carbon.

Table 4 Number of studies by category and country

Numbers	LCA	Landscape	Landscape sensitivity/ capacity	Renewables/ wind SPD/SPG	Landscape sensitivity/ capacity for wind	Renewables/ wind/carbon
England	143	19	24	29	31	50
Wales	5	2	1	10	6	7
Scotland	17	9	2	22	17	0
Total Britain	165	30	27	61	54	57

LCA = Landscape character assessment, SPD = Supplementary Planning Document, SPG = Supplementary Planning Guidance.

Table 5 breaks down the numbers in England by the type of councils. District borough councils are the leader followed by the unitary authorities. Because county councils do not have planning authority over wind farms, they have relatively few studies though some have taken the lead with landscape character assessments. Similarly Metropolitan Districts which cover mainly cities have few studies as they are urban landscapes.

Table 5 Number of studies by councils in England

	LCA	Landscape	Landscape sensitivity/ capacity	Renewables/ wind SPD/SPG	Wind landscape sensitivity/ capacity	Renewables/ wind/carbon
County councils	13	3	0	0	1	11
District councils	74	9	18	19	15	26
Metropolitan districts	19	2	2	2	5	5
Unitary authorities	37	5	4	8	10	8
Total	143	19	24	29	31	50

Table 6 shows the number of councils that have carried out landscape character assessments, with Scotland having the highest percentage and Wales, the lowest.

Table 6 Number of councils with landscape character assessments by country

	England	Wales	Scotland
Councils with LCAs	133	5	17
% councils with LCAs	48.31	22.73	51.52

LANDSCAPE CHARACTER ASSESSMENTS

In 2002, the Countryside Agency and Scottish Natural Heritage issued *Landscape Character Assessment Guidance for England and Scotland* (Swanwick, 2002) to guide councils in assessing their landscapes. The guidance was the outcome of several decades of activity in England to address the landscape.

There were a total of 165 LCAs conducted in Britain, 143 in England, 17 in Scotland and five in Wales. In England, the majority, 74 were prepared by district/borough councils, and unitary authorities prepared 37. County councils prepared 13 and metropolitan districts prepared 19. In Scotland, nearly 52% of councils have prepared a LCA while in the England the figure is 42.5% and Wales 23%. Some councils have actually prepared two LCAs, one in the 1990s or early 2000s and a revision more recently.

Early studies

Early attempts to assess the landscape (e.g. Fines, 1968; Linton 1968) focused on its aesthetic quality and in 1970, the Countryside Commission engaged the Department of Town and County Planning at the University of Manchester to recommend a standard approach to evaluate landscape quality for the Commission. The report (Robinson *et al*, 1976) recommended two methods, both based on people's perceptions of quality and used statistics to derive valid results. The Commission, however, rejected the recommendations, possibly because of the complex statistical methods they involved.

Years later, Professor Carys Swanwick (2002) of the University of Sheffield identified the Manchester study as an exemplar of a "supposedly objective, scientific, often quantitative approach" which led "to a considerable degree of disillusionment with this type of work." She elaborated, "This was largely because many believed it inappropriate to reduce something as complex, emotional and so intertwined with our culture, as landscape, to a series of numerical values and statistical formulae."

Swanwick (2002) identified this early method as attempting an *evaluation* of the landscape, showing why one area was *better* than another. This gave way in the 1980s to the *assessment* method which described why one area was *different* or *distinct* from another area rather than their relative value. In the 1990s the focus switched to descriptions of landscape character. The Manchester Report cautioned against landscape character assessment: "It is important not to confuse the analysis of landscape character, which is descriptive, and analysis of quality, which is evaluative" but this was not heeded.

European Landscape Convention

In 2004 the European Landscape Convention (ELC) entered into force (Council of Europe, 2000). It came into force in the UK in 2007. Its definition of landscape reflected the UK approach: *an area, as perceived by people, whose <u>character</u> is the result of the action and interaction of natural and/or human factors*. The UK was "highly influential in the development of the ELC, the text can be seen to embed much of the thinking - or the principles - by which landscape was already being planned, managed and designed in the UK" (Roe, 2013, Sarlöv-Herlin, 2016).

Based on the ELC, the following five principles should be adhered to whatever the scope and methodology adopted in a landscape character assessment (Tudor, 2014):

1. Landscape is everywhere and all landscape and seascape has character. The ELC covers landscapes that might be considered outstanding as well as everyday or degraded landscapes;
2. Landscape occurs at all scales and the process of landscape character assessment can be undertaken at any scale;
3. The process of landscape character assessment should involve an understanding of how the landscape is perceived and experienced by people;
4. A landscape character assessment can provide a landscape evidence base to inform a range of decisions and applications;
5. A landscape character assessment can provide an integrating spatial framework – a multitude of variables come together to give us our distinctive landscapes.

Countryside Commission Guidance

From the late 1980s onwards, the Countryside Commission and its successors addressed landscape assessment and published the following national guidance documents:

1987 *Landscape Assessment, a Countryside Commission Approach*. CCD 18;
1993 *Landscape Assessment Guidance*, CCP 423;
1999 *Interim Landscape Character Assessment Guidance* (Scotland);
2002 *Landscape Character Assessment: Guidance for England and Scotland.*

Conducting Landscape Character Assessments

Natural England, the agency that replaced the Countryside Agency, detailed how to conduct a landscape character assessment (Tudor, 2014):

1. Define the purpose and scope of the LCA: The area it will cover, its scale, level of detail and resources required, stakeholder engagement.
2. Conduct a desk study: Collect, review and analyse background data and documents and speak to stakeholders involved with the landscape, derive draft areas of common character.
3. Conduct a field survey: Prepare field survey sheet, test, refine and add to the outputs from the desk study, capturing aesthetic, perceptual and experiential qualities of the landscape.
4. Classification and description: Classify, map and describe the landscape's character areas, types and characteristics including geological, other physical and socio-cultural influences.

Typically the LCAs describe the physical and human influences on landscape character, including the underlying geology, rivers and lakes, woodlands, the pre-historic use of the area back to the Neolithic era covering the Bronze and Iron Ages, Roman occupation, medieval farming and any traces such as ancient furrows and mounds, current land use, settlements and population. This background section is often very informative and provides an interesting summary of the region. Landscape types are defined, based generally on the geology, landforms, vegetation and human influences and these are then subdivided into landscape character areas which are discrete areas of similar character. Boundaries between landscape character areas are zones of transition as one area merges into another.

Descriptions of each landscape character area follow, covering much of the above in more detail, and adding their visual elements and character, literary and artistic associations, tranquillity, condition of the landscape, and pressures for change in the landscape, The

LCAs articulate a vision and a strategy for the landscape and define a set of generic guidelines.

Perceptual characteristics are defined in the landscape character assessment guidance: scale, enclosure, diversity, texture, form, line colour, balance, movement and pattern. These focus on how each contributes to the aesthetic characteristics. Tranquillity is defined by analysis of noise levels, perceived naturalness, visible overt human impact and density of settlement/diffusion of people (Jackson *et al*, 2008).

Each of the landscape character areas are evaluated on the basis of:

- Landscape and visual sensitivities: Positive attributes which need to be retained.
- Strength of character or intactness: The condition of the landscape and the strength of its key characteristics.
- Landscape strategy: Based on the landscape character and sensitivities, identifying any measures for enhancing the landscape.
- Landscape guidelines: Covering landscape management, development and actions needed to retain its distinctive character.

Reviews of LCAs

A review of 78 LCAs prepared between 2007 and 2012 (Butler and Åkerskog, 2014) found that 43 did not contain a definition of landscape while most of the remainder defined it as a perceived entity, e.g. the Peak District LCA follows the European Landscape Convention:

> "Landscape is more than just the 'view'. It is about the relationship between people, place and nature. It is the ever-changing backdrop to our lives….the way different components of our environment – both natural and cultural – interact together and are perceived by us."

The survey found that all LCAs raised awareness of individual landscapes but because of the ambiguity of the word and its multiple meanings, it was "problematic to communicate the concept of landscape to the public." However, the public's involvement expanded their awareness and understanding of the landscape, even if it is "difficult to comprehend exactly what is being assessed."

Because the LCAs were prepared by professionals with minimal public input, they probably fail to "recognize diverse and conflicting values bound up in the landscape and see it as a relatively harmonious and static entity." Butler and Berglund (2014) concluded from their study of 52 LCAs that "although 'experts' views are invaluable, for much of a landscape assessment they are unreliable for judging the values people attach to 'their' landscape."

Paradoxically, the one professional group whose preferences appear to differ from that of the community is landscape architects. More surveys found that their preferences differed than studies that found similarities (Lothian, 2017). From his meta-analysis of 107 studies, Stamps (1999) found a correlation of only 0.60 between expert and lay. While the preferences of natural resource managers and planners generally corresponded reasonably well with those of the community, the views of landscape architects were often at significant variance from the community.

Jacobs (2019) explored the challenges for landscape architects in assessing the visual impact assessment of development projects based on landscape character assessments. He observed that landscape architects have found the national and local character assessments "are not helpful in establishing a common consensus on the existing landscape character because of the differences in scale between the LCAs and the project scale."

Early in the Scottish experience with LCAs, Julie Martin Associates & Swanwick (2003) reviewed 30 LCA reports and they found the following strengths:

- It provides a key tool for use by SNH staff;
- Has achieved formal recognition in central government policy and advice;
- Was the first full-coverage, detailed LCA programme completed in Europe;
- Provides a clear, systematic coverage of landscape issues;
- Has raised awareness of landscape concerns;
- Involved all Scotland's local authorities and several other partners;
- Well-used by planners in development planning and development control;
- Provides a strong platform from which to implement the European Landscape Convention.

However they also identified the following weaknesses:

- Variations between different LCAs;
- Blurring of characterisation and judgement stages in the assessment process;
- Limited stakeholder input;
- Limited range of LCA applications;
- Need to extend awareness of outputs and how they can be used;
- Lack of external web access to LCA outputs;
- Limited influence on national landscape policy issues;
- Lack of a national 'top-down' perspective.

An examination of landscape character assessments conducted by English councils found that the word *scenic* is rarely used, nor is aesthetics. The word *value* is used but not in relation to aesthetic values but rather in reference to cultural/heritage values and ecological/habitat/ nature conservation values. The following definition summed up the approach to LCA: "Landscape character assessment is an objective, value-free assessment of landscape concerned with character rather than quality or value." (Yorkshire Dales LCA, 2002. emphasis added).

LANDSCAPE REPORTS AND STRATEGIES

Thirty reports focussed on landscape more generally than landscape character assessments. Nineteen were in England, nine in Scotland and two in Wales. In England they were mostly prepared by district/borough councils and unitary authorities.

These reports fell into three main areas:

- Landscape designation reports – reviewing and revising earlier landscape classifications
- Identifying special landscapes
- Establishing design principles for developments

Many of these reports, particularly those in Wales and Scotland, rated landscape quality generally on a high, medium and low classification. This provided the basis for identifying special landscapes. An example was the West Lothian Local Plan (2009) which defined Areas of Great Landscape Value and Areas of Special Landscape Control.

Perth and Kinross Council in Scotland used a questionnaire of residents to rate the landscapes, high, medium or low, on a map. One of the questions was:

> "To what extent is the landscape of scenic value in its own right or to what extent does it contribute to the scenic qualities of the wider area?"

The high category was described as follows:

> "Pleasing combination of features, visual contrasts and/or dramatic elements. Visual, sensory, perceptual and experiential qualities which contribute to the natural beauty and appreciation of the landscape."

Also medium & low qualities were defined. The questionnaire also asked: Does the landscape provide key views into and out of the landscape? High, medium, low.

The Tameside Metropolitan Borough Council in England in its Countryside Strategy (2009) stated that the Borough contained landscapes of high quality. However, it also stated:

> "Natural England are (sic) encouraging a radically different approach to dealing with landscape considerations in development plans, and in design and management. It favours 'landscape character assessment'. This aims to provide an understanding of the character and potential for enhancement of all landscapes, while continuing to protect and enhance the best."

It is interesting that although the Council had identified high quality landscapes, it was compelled to follow the official line and consider only landscape character instead.

Dorset Council (2010) used its LCA to develop a Landscape Change Strategy with the aim to: "...provide a planning tool to help manage change in the county whilst minimising impacts on landscape character and where possible enhancing it." Focusing initially on 16 landscape character areas, it took the following steps:

- Identify the key positive landscape attributes for each landscape character areas;
- Collate information on the landscape condition of each LCA landscape character areas;
- Compile a list of past, current and future forces for change impacting on the positive attributes
- Collect information to inform the preparation of landscape management guidelines

Several councils including Norwich and Staffordshire Councils defined landscape design principles for best practice for application to development proposals.

LANDSCAPE SENSITIVITY AND CAPACITY

There were 27 reports on landscape capacity and sensitivity, 24 of which were in England and one in Wales and two in Scotland. In England they were mostly prepared by district/ borough councils.

Countryside Agency guidance

The basis of the analysis for most of the studies was the 2004 publication by the Countryside Agency, *Techniques and Criteria for Judging Capacity and Sensitivity*.

Landscape capacity is defined as the degree to which a landscape can accommodate change without its character being affected, while landscape sensitivity is the inherent sensitivity of the landscape regardless of the type of change.

Landscape sensitivity is defined as a function of: <u>landscape character sensitivity</u> (natural factors, cultural factors, landscape quality/condition, aesthetic factors [i.e. scale, enclosure, diversity, texture, pattern, colour, form/line, balance, movement]) + <u>visual sensitivity</u> (general visibility, population, mitigation potential).

Landscape capacity to accommodate specific type of change is a function of the following: landscape character sensitivity + visual sensitivity + landscape value (i.e. designations: national, local, and other criteria indicating value: tranquillity, remoteness, wildness, scenic beauty, cultural associations, conservation interests, consensus on value).

Reaching judgements about the landscape sensitivity needs to judge, firstly, its character, quality and condition, aesthetic components, and the sensitivity of its individual elements, and secondly, its visual sensitivity taking into account its general visibility and the potential to mitigate visual impacts. Landform and land cover are the dominant components of visibility. It should also consider the number of people viewing the landscape.

Scoring these may use a five point Likert-type scale from best to worst, or alternatively a three category framework from low through medium to high as illustrated in Figure 4.

Landscape Character Sensitivity	Low	Medium	High
High	HIGH	HIGH	HIGH
Medium	MEDIUM	MEDIUM	HIGH
Low	LOW	MEDIUM	HIGH

Visual Sensitivity

Combining Landscape Character Sensitivity and Visual Sensitivity to give overall Landscape Sensitivity

Landscape Sensitivity	Low	Medium	High
High	MEDIUM	LOW	LOW
Medium	MEDIUM	MEDIUM	LOW
Low	HIGH	MEDIUM	MEDIUM

Landscape Value

Combining Landscape Sensitivity and Landscape Value to give Landscape Capacity

Figure 4 Assessment of landscape sensitivity and landscape capacity

Council studies of landscape sensitivity and landscape capacity

The North East Lincolnshire Council (2015) classified landscape sensitivity in five categories:

- High: Landscape areas of particularly distinctive or very positive character, with valued landscape features;
- High - medium: Landscape areas of some distinctive or positive character, with some valued landscape features;
- Medium: Landscape areas of a reasonably positive character, with limited valued landscape features;
- Medium - low: Landscape areas of some character, with few valued landscape features and evidence of some degradation of character or features;
- Low: Landscape areas of a weak character, with very few, if any, valued landscape features value and evidence degradation of character or features.

Telford & Wrekin Council (2009) adopted the following classification of landscape sensitivity:

- High: Key characteristics of landscape are very vulnerable to change and/or have significant value as a landscape resource.
- High – medium: Key characteristics of landscape are vulnerable to change and/or have high value as a landscape resource;
- Medium: Key characteristics of landscape are susceptible to change and have value as a landscape resource;

- Medium – low: Key characteristics of landscape are resilient to change and/or are of limited intrinsic value as a landscape resource;
- Low: Key characteristics of landscape are robust and/or are of relatively low intrinsic value as a landscape resource;

The capacity rating for housing was based on the sensitivity of a zone and the likely magnitude of effect and character of proposed development and categorised as follows:

- High: Thresholds for significant change are very high and much of the area can be developed.
- High-medium: Thresholds for significant change are high and the area is able to accommodate a significant proportion for development.
- Medium: Thresholds for change are intermediate with some ability to accommodate development in some parts.
- Medium-low: Thresholds for change are low and development can be accommodated only in limited situations.
- Low: Thresholds for change are very low and the area is unable to accommodate development without significant adverse effects.

In Scotland, the East Ayrshire Council (2015) assessed the sensitivity of its landscape to development by applying the following criteria:

- Landscape as resource
- Scenic quality
- Unspoilt character
- Sense of place
- Conservation interest
- Consensus

Each landscape character area was assessed on a high, medium, low classification and then a judgement made of its overall sensitivity. Areas classified as high formed the Sensitive Landscape Area in the Council's Structure Plan.

Landscape capacity and sensitivity studies of potential housing and urban developments were conducted by the following councils:

- England: Amber Valley, Brentwood, Chorley, Dorset, Harlow, Horsham, Rotherham, Stafford, Stevenage, South Staffordshire, Swale, Telford & Wrekin, Tunbridge Wells, West Lancashire, Wirral.
- Wales: Monmouthshire
- Scotland: East Ayrshire, North Ayrshire

RENEWABLES AND WIND ENERGY SDPs AND GUIDANCE

Supplementary Development Plans (SDP) provide additional guidance on the interpretation of planning policies contained in the Local Development Plan and should be afforded significant weight as a material consideration in determining planning applications. Supplementary Guidance Documents do not have the legal status of SDPs but provide useful guidance to developers, councillors and planning officers, and the community.
In Britain, 61 SDPs or SGPs were developed, 29 in England, 22 in Scotland the remaining 10 in Wales. In England they were mostly prepared by district/borough councils which had the authority to approve wind farms.

While some documents covered the full range of renewables, including solar, hydro, wind, biomass and heat pumps, most focussed on wind energy. Wind energy ranges from small

domestic size turbines which are generally only one turbine, through to large scale wind turbines which may be 150 metres high and number a dozen or more turbines.

In 2010, Natural England issued a guidance document: *Making space for renewable energy: Natural England's approach to assessing on-shore wind energy development.* Landscape character is the result of the unique combination of elements that makes one place different from another. This examined the interaction of wind farms with geology, landform, ecology, the historic environment, cultural heritage and recent development, and aesthetic and perceptual factors. It also provided data sources for evaluating each of these and discussed cumulative impacts.

Figure 5 is the guidance by the Department of Energy and Climate Change of the stages involved in developing renewable energy in an area, starting from the large naturally available resource and narrowing it down to what may be achieved.

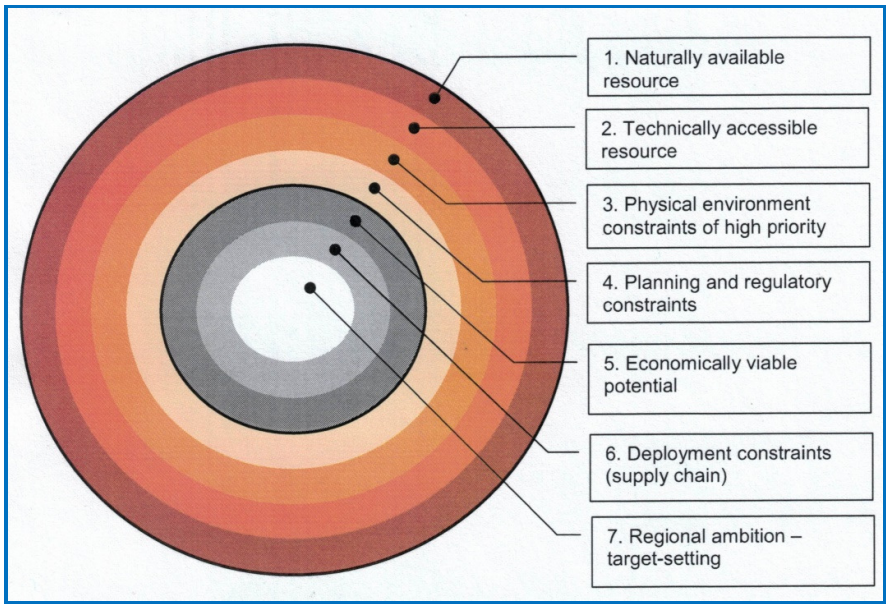


Figure 5 Stages for developing a comprehensive evidence base for renewable energy potential

Assessing wind farm proposals in and near National Parks and AONBs is discussed. Wind farms are not prohibited but: *the conservation of the natural beauty within National Parks, the Broads and AONBs should be given great weight in planning policies and development control decisions and that major development within these areas should not take place, except in exceptional circumstances*. The natural beauty of an AONB and National Park are to be given equivalent importance.

Reaching a decision about a wind farm proposal involves considering the whole landscape including ecological, geological, landscape, and visual factors, making a judgement about each of these, and then making an overall judgement.

England

Some councils require the proponent to prepare a visual impact assessment of the wind farm proposal based on *Guidelines for Landscape and Visual Impact Assessment* (Landscape Institute, 2013). Others may require an Environmental Impact Assessment.

Factors considered regarding the impact of wind farms on landscape character and quality

Councils use lists of factors to evaluate the impact of wind farms on their landscapes and the following is an amalgam of these.

1. Predicted wind speed at 45 m height (6 m/sec minimum = 21.6 km/h);
2. Landscape and visual impacts including on the pattern, combination of texture, form, line, colour and balance which help to define the landscape character of an area, impact on important viewpoints and on popular tourist and scenic routes (including the public rights of way network, cycle and multi-use routes, and other recreational trails with permissive access), impact on views to landmarks and skylines;
3. Scenic quality, that is visual appeal due to important views, visual interest and variety, contrasting landscape patterns, or dramatic topography which may increase landscape sensitivity to wind energy development;
4. Cumulative landscape impacts resulting from the number of turbines exceeding the landscape capacity of the locality, thereby degrading its overall character and quality.
5. Landform and topography;
6. Slope: turbines cannot be erected on sites with a slope over 15º;
7. Land use, land stability, ground capability to support turbines, land contamination, soil resources and loss of agricultural land, flood zones;
8. Gas pipelines and other sub terrain infrastructure;
9. Overhead power lines;
10. Land cover and vegetation, Registered Parks and Gardens, Ancient Woodlands;
11. Rivers, canals, reservoirs, lakes - buffer of 150m;
12. Floodplains and hydrology;
13. Townscape setting pattern and density, urban edge character, built environment;
14. Cultural features, individual and groups of heritage assets, sites of archaeological significance, sites of historic interest - sites of historical events and battles;
15. Cultural heritage features and associations with particular people – writers, composers, artists, statesmen;
16. Recreational activities including National Trails and existing footpaths (50 m buffer), horse bridleways and equestrian trails (200 m buffer recommended by British Horse Society), mountain bike trails;
17. Natural features, nature conservation, biodiversity and ecology interests including bird migration routes, bird and bat roosting areas; sites of national, regional or local significance;
18. Amenity and perceptual aspects including disturbance of neighbours and the surrounding community, noise implications (“aural amenity”) and amplitude modulation, shadow flicker, impact of lights on rural areas at night, vibration, rotor blade movement which may affect characteristics of stillness, peacefulness and tranquillity; an increase in the perceived human influence on the landscape; competition with existing landmark features (e.g. nearby church spires);
19. Designation of areas at national, regional or local level as of nature conservation, scientific or archaeological interest - World Heritage sites, National Parks (and potential extensions), Areas of Outstanding Natural Beauty (AONBs), Special Protection Area (SPA), Special Areas of Conservation (SAC), RAMSAR Convention wetland sites, Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Natura 2000 sites, Biosphere Reserves, Biodiversity Opportunity Areas (BOAs), Ecological Character Zones (Wales), National Nature Reserves (NNR), Heritage Coasts, Scheduled Ancient Monuments, Listed Buildings (English Heritage), Green Belt, Royal Society for the Protection of Birds reserves. While wind farms in National Parks are prohibited, visibility from a National Park should also be considered;
20. In Scotland, National Scenic Areas (NSA) are areas of exceptional landscape designated for their outstanding scenic interest;

21. In Wales: Historic Landscape or Geological Landscapes, Land on the Register of Landscapes of Historic Interest, Land on the Register of Parks and Gardens of Special Historic Interest;
22. Highway and railroad safety: buffer from public highways, footpaths, cycle paths and bridleways of turbine height +10%; Scotland: height + 50%;
23. Protection against ice-throw from blades, 100 m from roads (Aberdeen City Council, 2017);
24. Road upgrades to enable transport of long blades and hubs may alter the character of rural roads through the removal of hedgerows and stone walls, road widening, junction improvements and removal of trees. Access tracks may be highly visible, particularly in open upland landscapes or undeveloped landscapes that currently may not contain tracks. Transportation of the towers and blades of up to 90 m in length can cost 20% of equipment costs (Gwynedd County Council, 2014);
25. Borrow pits for construction materials - their visual impact and potential for restoration;
26. Ancillary buildings and security requirements (including fencing) introduces new features into the landscape. The electrical sub-station and above-ground grid connection adds further structures;
27. Lighting of turbines (for aviation safety) may introduce a source of light that would affect local amenity or intrinsically dark night skies. Turbines higher than 150 m are required by civil aviation authorities to have red lights spaced along the hub and at the top of the hub (CAA, 2016);
28. Significant electromagnetic interference to communications, radar or air traffic control systems, emergency services communications, or other telecommunication systems. TV transmission masts/TV broadcast links/Radio broadcast & transmission masts all 100m buffer. Weather radar stations 10 km. Reflections from high turbines can affect the side lobes of radar installations, creating signal clutter, although this can be suppressed by filters. Need for additional electrical cabling to connect to the National Grid;
29. Airfields, aerodromes and aviation – buffers of 6 km are the most common but can be up to 30 km around international airports; impacts on air radar systems; The Civil Aviation Authority (2016) describes the effects on radar. Turbulence from wind turbines extends up to 16 rotor diameters and can affect landing aircraft (CAA, 2016);
30. Military (MOD) constraints including tactical training areas and air defence radars;
31. Meteorological Office radar - buffer of 1km;
32. Electricity transmission lines, buffer 100 m;
33. Scope for mitigation of negative impacts;
34. Wind anemometers which may remain during the lifespan of the wind farm;
35. Shadow flicker – see below;
36. Separation of 5 rotor diameters between wind turbines;
37. The proposal has the backing of the local community.

The cumulative sum of these impacts needs to be identified for every proposed wind farm, together with measures intended to mitigate or minimise any impacts, and judgements reached whether the projected benefits outweigh its negative aspects. As an example, Northumberland County Council (2009) in the SDP for Alnwick states: “all proposals for development and change will be considered against the need to protect and enhance the distinctive landscape character of the district”. Each proposal is judged on its merits.

Wind turbines should normally be located at a distance of at least 10 rotor diameters from dwellings to avoid shadow flicker. It has also been proven that within this 10 rotor diameter, shadow flicker will only occur in some conditions for some of the time and will only affect nearby properties within 130° either side of north (UK Govt).

The landscape advice in some reports ignored the requirement of turbines for sufficient wind. An example was Dorset Council (2012) which suggested that “wind development should be grouped with existing development towards the lower slopes and should not interrupt open skylines…” The energy generated by a wind turbine is proportional to the cube of the wind

speed so if they are in a valley they are unlikely to have the wind velocity required. They may also affect nearby settlements.

Separation distance

Fenland District Council (2009) quantified the impact that turbines are likely to have on each of the district's landscape types, and draws conclusions on the extent to which each landscape type can accommodate different 'magnitudes' of impact. It sets out the following (based on Scottish Planning Advice Note 45).

Distance from Turbines	Magnitude of Visual Impact
Within 400m	Dominant
400m - 2km	Prominent
2 - 5km	Conspicuous
5 - 15km	Apparent
15 - 30km	Inconspicuous
Over 30km	Negligible

Cherwell Council (2011) reviewed appeal decisions to ascertain whether a single separation distance from wind turbines to housing had been derived but found “there is no single 'separation rule' relating to residential amenity being applied across the country, with judgements in each case being determined by local circumstances.” The Council recommended 800 m as an appropriate distance. However most councils have adopted 500 m as the buffer although DECC (2010) recommended 600 m. Calderdale Council (2017) adopted 200 m for commercial properties.

Blackburn with Darwen Borough Council (2013) proposed the separation distance relate to the height of the turbines:

Indicative minimum acceptable distances between wind turbines and residential properties

Height m	<50	50 - 70	71 - 85	86 – 99	100 – 130	131 – c150
Distance m	275	440	490	540	600	700

Similarly, Hinckley and Bosworth Council (2014) recommended 600 m for large turbines, 500 m for medium turbines and 400 m for small turbines.

A Private Members Bill (Wind Turbines [Minimum Distance from Residential Premises] Bill, 2011 & 2012) aimed to establish a minimum distance between wind turbines and residential properties based on the turbine height (see Cherwell Council, 2011). Turbines 25 – 50 m high would require one km distance extending to three kms for those over 150 m high. These distances are much greater than those adopted by Councils and unsurprisingly, the Bill has not progressed.

The size of the buffer plays a crucial role in determining how many turbines can be installed in a given area. Fareham Council (2013) found that 5.06 km^2 was least constrained for wind development assuming a 300m buffer on properties, whereas a 500 m buffer reduced this to 1.32 km^2.

Regarding aerodromes, East Hampshire Council (2018) recommended the following:

- 30 km for aerodromes with a surveillance radar facility.
- 17 km for non-radar equipped aerodromes with a runway of 1,100 m or more, or 5 km for those with a shorter runway.
- 4 km for non-radar equipped unlicensed aerodrome with a runway of more than 800 m or 3 km with a shorter runway.
- 10 km for the air-ground air communication stations and navigation aids.

- 15 nautical miles for secondary surveillance radar.

The Civil Aviation Authority (2016) defines distance requirements for differing aerodromes depending on their runway length and the presence of radar.

Cheshire West and Chester Council (2012) applied the DECC methodology (see Figure 5) to potential renewables in their area and derived Table 7. The total possible was 844 large turbines but after taking into account International and National Designations for Nature Conservation reduced it to 299 and then filtering by the other constraints reduced it further to 118 turbines. However, after considering buffers around the dispersed settlements, the report concluded that there were few opportunities for large scale wind farms in the Borough.

Table 7 Parameters and constraints applied to the assessment of wind energy potential

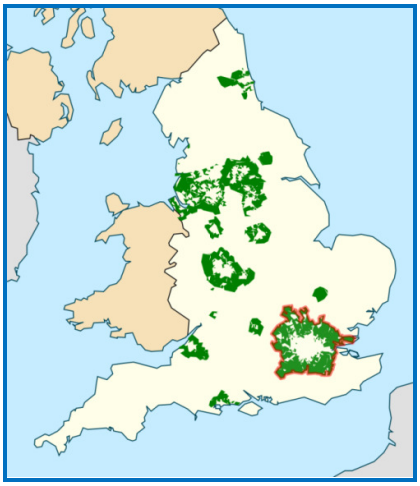
Assessment stage	**Large scale turbines (2.5MW)**	
	Layer	**Buffer**
Stage 1: Naturally available resource	Wind speed at 45 m above ground level	-
Stage 2: Technically accessible resource	Exclude areas with wind speed @ 45m above ground level < 5m/s	-
Stage 3: Non accessible areas due to physical environment constraints	Roads (A, B, and motorways)	-
	Railways	-
	Inland waters	-
	Residential properties	-
	Commercial buildings	-
	Airports and airfields	-
	MOD training sites	-
Stage 4: Areas where wind developments are unlikely to be permitted	Ancient woodland	-
	Roads (A, B, and motorways) & Railways	150 m
	Residential properties	600 m
	Commercial buildings	50 m
	Civil airports and airfields	5 km
	MoD airbases	5 km
	Sites of historic interest	-
	International and National Designations for Nature Conservation	-
	International and National Landscape designations	-
	Jodrell Bank exclusion zone	-

Cheshire West and Chester Council, 2012. Low Carbon and Renewable Energy Study

Dorset Council (2012) observed that the National Association of Areas of Outstanding Natural Beauty position statement for renewable energy requires the visual appraisal to identify the Zone of Visual Influence and assess the developments impact upon key viewpoints from within the AONB and its setting.

Regarding AONBs, they are not an absolute constraint as the precedent has been set by the Goonhilly Wind Farm in Cornwall (six by 2.5 MW turbines) (Solihull Metropolitan Borough Council, 2010).

The Green Belt, declared around major urban areas to prevent urban sprawl (Figure 6), is a possible site for wind farms. In Hertfordshire the Green Belt covers much of the county. While the total area that could be available for large scale wind energy is 1,084 km^2 based on engineering constraints and 82.75 km^2 based on further constraints. However if the 521 km^2 of the Green Belt were available, this would increase to 604 km^2.



Wikipedia: Green Belt (UK)

Figure 6 Green Belts in England

Regarding the Green Belt, the National Planning Policy Framework states (MHCLG, 2012):

> "When considering any planning application, local planning authorities should ensure that substantial weight is given to any harm to the Green Belt. 'Very special circumstances' will not exist unless the potential harm to the Green Belt by reason of inappropriateness, and any other harm resulting from the proposal, is clearly outweighed by other considerations."

Such special circumstances could include the reduction of greenhouse gases from such development. A consultant's report to Brentwood Borough Council (2014) suggested that large scale wind farms could be acceptable adjacent to the M25 though in the Green Belt. In West Lancashire which comprises the Green Belt over the entire area, a wind turbine was permitted at a factory south of Skelmersdale (West Lancashire Borough Council, 2019).

Other impacts

Cornwall Council (2016) observed that renewable energy developments might enable farmers to manage their land in the traditional way, including with small fields and hedgerows and avoiding large scale barns as with the income from the development they need not expand their holding.

Pendle Council *et al* (2010) observed:

> "contemporary landscape displaying masts, pylons, industrial elements, buildings and infrastructure is more likely to accommodate wind energy development than an unpopulated or sparsely populated landscape characterised by established, traditional settlements, buildings or structures."

Repowering of turbines involves replacing smaller turbines with larger ones. The advantages of this were identified by South Larnarkshire Council (2019) as including: a simpler, less busy, less cluttered appearance, the larger turbine blades turn more slowly which appears less busy and their wider spacing reduces clutter. However the larger turbines will be visible over greater distances and taller structures may require aviation lighting which increases their visibility at night.

South Kestervan District Council (2013) stated that as substantial vertical structures which inevitably will be visible, wind turbines in contrast to "pylons and other stationary structures …*are moving features* in the landscape" which draws the eye and makes them doubly

visible. East Northamptonshire Council (2014) stated that the "rotor blade movement … may affect characteristics of stillness, peacefulness, and strong rural character."

Movement of the turbine blades introduces movement into the view (Pendle *et al* councils, 2010) and draws the eye towards them and therefore increases their visibility (Fareham, 2013). Cheshire East Council noted that the "movement of rotor blades is a unique feature of wind energy development and may affect characteristics of stillness, remoteness and solitude". It was also observed that larger models having slower rotor speeds than smaller models (Staffordshire Moorlands DC, 2015). The presence of turbines may increase the perceived human influence on the landscape (Torridge District Council, 2011). It was observed that moving turbines were observed from 20 km distance – further than if they were still (Northumberland County Council, 2015).

In reference to the focal length for photographs of wind farms, a study by Scottish Natural Heritage (2017) recommended photographs at 75 mm instead of the traditional 50 mm as better representing the scale of wind farms as seen in the field. South Kestervan District Council (2013) also suggested that a 75 mm lens be used in cameras in preference to the standard 50 mm lens as the 75 mm is closer to what the human eye sees.

On behalf of five borough councils and the Lake District National Park Authority, Cumbria County Council (2007) identified the thresholds for identifying landscape value based on landscape capacity assessment (Table 8). These call for largely subjective judgements but provide a range of possible values from low to high.

Table 8 Landscape Value Assessment Criteria

Key Indicator	Attributes indicating lower value	↔	Attributes indicating higher value
Landscape Designation	No specific designation	↔	National or regional designation reflecting scenic quality e.g. AONB
Designated elements or features	Few if any designations	↔	Frequent designations of national or regional importance e.g. Registered Historic Parks and Gardens
Rarity	Common	↔	Unique
Conservation interests	Weak interest	↔	Strong interests e.g. ecology geology/ geomorphology, historic environment that affect peoples' perception and appreciation of landscape as well as having a value in their own right
Cultural associations	No specific associations	↔	Strong associations with particular people, artists, writers, or other media or events in history
Scenic quality	No visual appeal	↔	Strong visual appeal attributable to a particular combination of elements and the aesthetic qualities they produce
Perceptual aspects	Weak sense of place	↔	Strong sense of place attributable to qualities perceived by visual and other senses e.g. scenic beauty or attractiveness, remoteness, tranquillity and wildness
Associated Recreation or Amenity Function	Little or no recreation or amenity function	↔	Designated or well used for recreation or amenity such as public access, parkland or 'green' space

Cumbria County Council, 2007

Some councils, e.g. North East Lincolnshire, Calderdale, identify localities in which wind energy projects would be permitted, providing they satisfy the above criteria. Most councils, however, had not identified areas, preferring to consider each proposal on its merits. In 2005, the Welsh Assembly (2005) identified seven Strategic Search Areas (SSAs) which were largely forested windy upland areas, sparsely populated, of low conservation interest and of sufficient area to accommodate large wind farms which would meet the Welsh

Government's target of 800 MW of installed onshore capacity (Figure 7). Together these areas were capable of producing 1120 MW. Outside the SSAs should remain free of large wind farms though existing wind farms outside SSAs may be extended or re-powered.

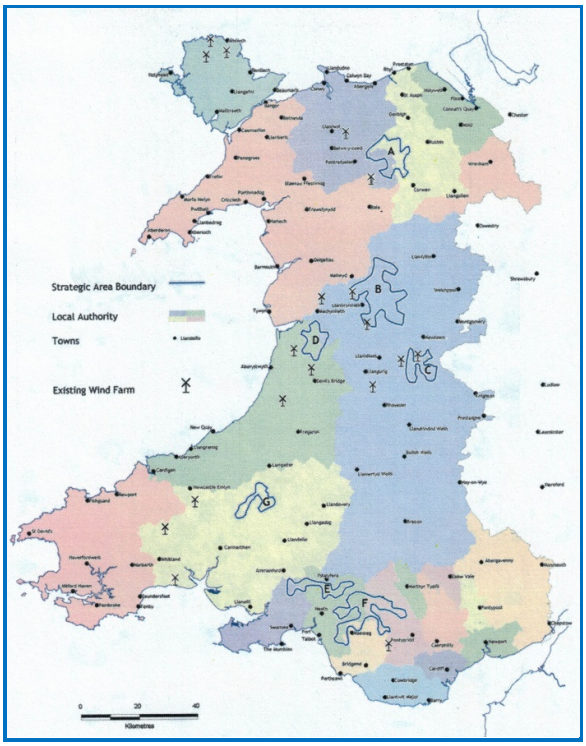


Figure 7 Strategic Search Areas, Wales

North East Lincolnshire Council (2015) suggested among the landscape principles that should be considered is the use of smaller but more turbines instead of the largest one available.

Based on Scottish research, North Lincolnshire Council (2003) established the following perception of a wind farm in an open landscape:

- Up to 2 kms Likely to be a prominent feature
- 2 to 5 kms Relatively prominent
- 5 to 15 kms Only prominent in clear visibility - seen as part of the wider landscape
- 15 to 30 kms Only seen in very clear visibility - a minor element in the landscape.

North Somerset Council (2014) indicated the following would be considered:

- Orientation of residential properties: Direct views are more likely to cause harm than oblique ones with windows facing the proposed site have a greater impact.
- Spacing/clusters of turbines: Prefer turbine layout to follow the shape of the terrain rather than straight rows of turbines which are likely to be more visually invasive.
- Scale and openness of the receiving landscape: No application should change the openness of the receiving landscape so dramatically that the impact is significantly detrimental. The availability of other features where present in view, (such as pylons and industrial buildings) to provide a comparison of the scale and perspective will be made.

Northumberland Council (2015) assessed the landscape impacts of existing wind farms in the county and the following summarises its main findings:

- Significant adverse landscape and visual effects from wind energy developments have arisen in parts of Northumberland.
- Significant cumulative landscape and visual effects across those parts of the county studied are also localised in extent.
- Most installed wind energy developments across the county have altered the balance of features within the landscape locally, but generally have not altered that character either significantly or irreversibly.
- The potential for harmful adverse cumulative landscape and visual and character effects is however increasing, and in more sensitive locations, significant. Landscape capacity may be close to its threshold in parts of the county.

The Study's technical findings included the following:

- Submitted landscape, visual and heritage assessment material in support of planning applications for wind energy developments varies in quality and accuracy.
- Issues of inaccuracy in visualisations were consistently observed.
- Photomontage and wireframe visualisations of proposed wind energy developments invariably present images which when observed in the field under-represented the scale of visual prominence of installed turbines by around 30% (i.e. 50 mm photos instead of 75 mm).
- Some wind farm layouts as installed diverge from visualisations by a magnitude greater than could be attributed to micro-siting variations.
- Determination of the 'significance' of predicted impacts was inconsistently arrived at across the study sample.

Wales

Many Welsh Councils have prepared Supplementary Guidance Documents covering renewables in the landscape and generally require visual impact assessments of proposals (e.g. Bridgend Council, 2014; Blaenau Gwent Council, 2015). They seek to protect the rural and tranquil nature of the Welsh countryside to ensure that it is not overwhelmed by wind farms (Isle of Anglesey, 2013).

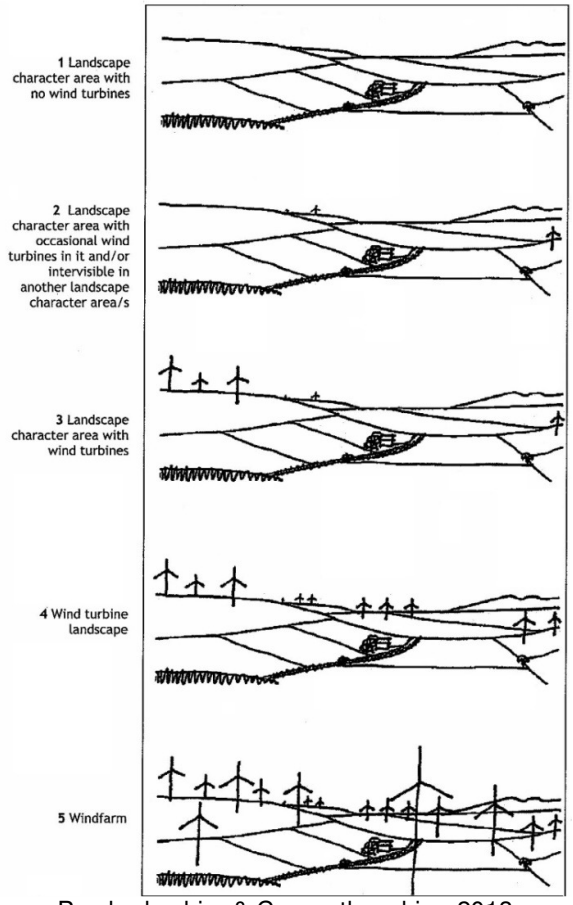
In a report prepared for the Carmarthenshire County Council, Pembrokeshire Coast National Park Authority and Pembrokeshire County Council (2013), the landscape was classified by the number of wind turbines, similar to Scotland's Groups 1, 2 and 3 (Table 9, Figure 8).

Table 9 Landscape types with regard to wind turbine development descriptions

Landscape type	Status description	Location within study area
Landscape character area with no wind turbines	No turbines within an area and not visible except at a distance where they are very small or inconspicuous.	This would be the status and objective in sensitive parts of the study area including parts of the National Park, coast and possibly Special Landscape Areas.
Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s	Turbines are visible but are not at a scale, number, spacing or extent that makes them a defining/key characteristic. Turbines might be seen occasionally at close quarters but more often within background views.	This is the 'maximum' status for the Pembrokeshire Coast National Park and most of the landscapes of the study area. The Renewable Energy SPG is useful in defining what may be appropriate levels of development in the National Park.
Landscape character area with wind turbines	Turbines are frequent and may include extensive wind farms and are the dominant, defining characteristic but there is separation between groups of turbines. However within	This is highly likely to occur in the Strategic Search Area as approved schemes are implemented.

	these areas wind turbines are likely to be visible.	
Windfarm	Landscape fully developed as a wind farm with no clear separation between groups of turbines.	Windfarm locations e.g. Alltwalis

Pembrokeshire & Carmarthenshire, 2013



Pembrokeshire & Carmarthenshire, 2013

Figure 8 Landscape types with regard to wind turbine development descriptions

Cumulative impacts of multiple wind farms are classified as follows (Pembrokeshire & Carmarthenshire, 2013):

- In combination - two or more turbines or groups of turbines which are seen by the observer from the same viewpoint at the same time;
- Successive - two or more turbines or wind farms are seen by an observer from the same viewpoint but only by turning to look in a different direction;
- Sequential - two or more turbines or wind farms are seen by an observer whilst travelling along a route, where no more than one may usually be seen at the time;
- Wind Farm Landscape - repeated views of wind farms can give travellers along a route the impression that it is now a wind farm landscape.

Scotland

The Scottish Government strongly supports onshore wind energy projects. It also acknowledged the way in which wind turbine technology and design is evolving, and fully supports the delivery of large wind turbines in landscapes judged to be capable of accommodating them without significant adverse impacts (Scottish Government, 2017b).

The Government has prepared several publications to assist and guide the wind farm industry and councils:

- *Assessing the cumulative impact of onshore wind energy developments* 2012
- *Siting and designing windfarms in the landscape* 2014, 2017
- *Visual representation of wind farms* 2017
- *Onshore wind policy* 2017
- *Scottish Energy Strategy, The future of energy in Scotland* 2017

The Scottish Government supports the repowering of wind farm sites areas which "should be suitable for use in perpetuity" (Scottish Government, 2017b). The advantages of repowering, it identified were threefold:

1. Increasing efficiency and reducing costs: changes in the market are driving developers to design repowered sites to maximise efficiencies and increase returns.
2. Maximising value: we recognise that advances in technology offer an opportunity to maximise the efficiency (and value) of individual sites, but there is also the scope to build on our distinct approach to energy policy and maximise value for Scotland in terms of economic, social and environmental benefits.
3. Wider economic and social benefits: repowering offers an opportunity to further pursue additional Scottish Government policy aims – in particular, shared ownership with communities and the encouragement of local involvement and community benefit.

Scottish Councils recognise that their landscape is one of their major assets, "providing an attractive environment for residents and tourists alike so protecting it without significant detrimental landscape, visual or cumulative impacts" from wind energy projects is a high priority (Dumfries & Galloway Council, 2020a).

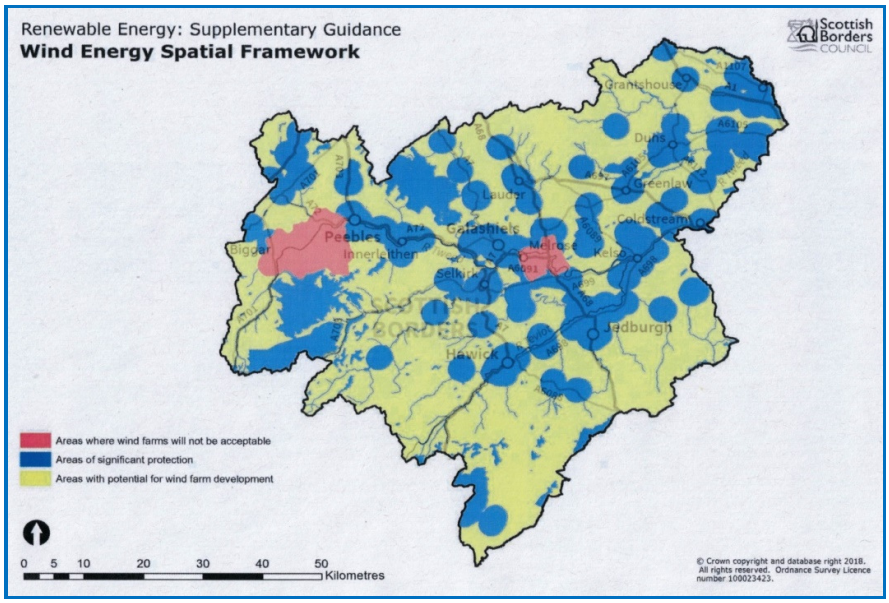
The Scottish Government has defined a common Spatial Framework which has been adopted across all councils. This divides council areas into three groups (Table 10).

Table 10 Groups 1, 2 and 3

Grouping	Description	Constraints to be considered in line with SPP
Group 1	Areas where wind energy (over 50 metres) will not be acceptable	National Parks National Scenic areas
Group 2	Areas of significant protection Wind energy developments (over 50 m) may be appropriate where it can be demonstrated that any significant effects on the qualities for which the area is identified can be substantially overcome by siting, design or mitigation	World Heritage sites, Natura 2000, Ramsar Sites of Special Scientific Interest, National Nature Reserves, Sites identified in the Inventory of Gardens and Designed Landscapes, Sites identified in the Inventory of Historic Battlefields, areas of wild land, carbon rich soils, deep peat and priority peatland habitat. An area not exceeding 2 km around cities, towns and villages.
Group 3	Areas with potential for wind energy development (over 50 metres)	No recognised constraints and applications are assessed against specified policy criteria.

Criteria are established by each council for Group 2 and 3. Generally a detailed landscape and visual impact assessment are required for proposals. A notable inclusion is the 2 km exclusion zone around urban areas (see Group 2). Based on the criteria, maps of the council area are included showing areas where wind energy projects are prohibited, areas of significant protection (Group 2) and areas which may have potential for wind farms (Group 3). Wind turbines are classified from small (15 – 30 m) up to very large (120 m +). There are many single small to medium size turbines on farms.

Figure 9 shows a typical Council map of the areas where wind farms would be prohibited (Group 1), have to meet significant criteria (Group 2), and areas with potential for wind farms (Group 3). The circular 2 km exclusion zones around urban areas are obvious.



Scottish Borders Council, 2016. Renewable Energy Supplementary Guidance.

Figure 9 Example of a Council map showing Groups 1, 2 and 3

Landscape and visual impacts are one of the many criteria against which proposals are assessed. Proposals must demonstrate that the landscape is capable of accommodating the development without significant detrimental landscape or visual impacts. Proposals often refer to studies of wind energy capacity, landscape sensitivity, landscape character and maps of the Zones of Theoretical Visibility. Also to be considered are viewpoints from settlements, walking routes, landmark hills, wild land, sensitive landscape areas and tourist routes (East Ayrshire Council, 2017) and views from iconic and important locations (Falkirk Council, 2015). Scottish Natural Heritage (2017a) noted that many of the landscape character assessments were produced in the 1990s and while adequate then, were not sensitive to wind farm development. They were working to remedy this.

Councils require wind farm applications to consider the impacts for many kilometres distance based on the total turbine height (Scottish Natural Heritage, 2017b):

- 101 – 130 m high 35 km radius
- 131 – 150 m 40 km
- 150+m 45 km

Scottish Natural Heritage (2017a) recommends that turbines should be coloured light grey in matt finish which is preferable as colouring them with greens, browns or ochres have not been successful. Graded colours near the base and advertising on them are to be avoided.

Cumulative impacts of multiple wind farms are also considered (e.g. Clackmannanshire Council, 2015; Falkirk Council, 2015).

Several councils, e.g. Dumfries & Galloway, North Lanarkshire, South Lanarkshire, considered landscape values as well as landscape character, “give added weight and rationale, especially as robust justification and citation of national and local designated landscapes … is available.” (Dumfries & Galloway Council, 2020b). Scottish Natural Heritage (2017a) states “Landscape and scenic value is recognised at national and local

levels through development plan policies and designations such as National Parks, National Scenic Area (NSA) or local landscape designations including new Special Landscape Areas (SLA) and Areas of Great Landscape Value (AGLV), World Heritage Sites and Conservation Areas." The Scottish recognition of landscape value goes much further than England's focus on landscape character.

SENSITIVITY AND CAPACITY OF THE LANDSCAPE FOR WIND FARMS

There were 54 reports on the sensitivity and capacity of the landscape for wind farms, 31 in England – mostly in district/borough councils and unitary councils, six in Wales and 17 in Scotland.

In 2006, the then Countryside Agency and Scottish Natural Heritage issued *Techniques and Criteria for Judging Capacity and Sensitivity* (see earlier).

The heights of wind turbines are often compared with tall structures in the council including communication towers, trees, pylons, church spires and buildings.

Sensitivity studies classify the size and number of turbines, typically as follows:

Height to blade tip

- Very small turbine ≤24 m (12 kW)
- Small turbine 25-59 m (0.5 MW)
- Medium turbine 60-89 m (1 MW)
- Large turbine 90-129 m (2.5 MW)
- Very large turbine ≥130 m (3+ MW)

Groups

- Small cluster (2-3 turbines)
- Small wind farm (4-5 turbines)
- Medium wind farm (6-10 turbines)
- Large wind farm (11-20 turbines)
- Very large wind farm (≥21 turbines)

Council reports on sensitivity and capacity generally follow a similar pattern:

- Describe the characteristics of wind farms;
- Describe the landscape character of the council, generally based on earlier work;
- Establish criteria for the assessment of sensitivity and capacity;
- Apply the criteria to landscape character types throughout the council;
- Provide guidance for wind energy developments.

Landscapes that have a high scenic quality (which may be recognised as a Heritage Coast or as designation as an AONB or Area of Great Landscape Value - AGLV) and whose scenic qualities or natural beauty are likely to be affected by wind energy development will be more sensitive than landscapes of low scenic quality or whose scenic qualities are not likely to be affected by wind energy development. This is because wind energy development has the potential to affect views and scenic quality that are valued in a landscape because of the absence of modern man-made features.

Councils generally rated sensitivity on a 5-point scale from low to high sensitivity, with three examples shown below.

Melton & Rushcliffe Council, 2014

Lower sensitivity <----------→Higher sensitivity

A landscape without attractive character, with no pleasing combinations of features, visual contrasts and/or dramatic elements, such as	A landscape of limited attractive character, with few pleasing combinations of features, visual contrasts and/or dramatic elements	A landscape of intermittently attractive character, with occasional pleasing combinations of features, visual contrasts and/or	A landscape of attractive character, with pleasing combinations of features, visual contrasts and/or dramatic elements	A landscape of outstandingly attractive character, with pleasing combinations of features, visual contrasts and/or dramatic elements, likely to be

an industrial area or derelict land		dramatic elements		recognised by national designation

Torridge District Council, 2011

Lower sensitivity <----------→Higher sensitivity

e.g. area has low scenic quality such as an industrial area or despoiled land	e.g. area has low medium scenic quality and is unlikely to have a scenic quality designation	e.g. area has a medium scenic quality (may be represented by the presence of AGLVs)	e.g. area has a medium-high scenic quality (may contain part of an AONB or Heritage Coast, or a combination of AONB/ Heritage Coast/AGLV)	e.g. area has a high scenic quality (much of the area is likely to be in an AONB/ Heritage Coast)

Cheshire East Council, 2013

Lower sensitivity <----------→Higher sensitivity

A very largescale landscape with uniform groundcover and lacking in human scale features	A landscape with large-scale fields, little variety in land cover and occasional human scale features such as trees and domestic buildings	A landscape with medium sized fields, some variations in land cover and presence of human scale features such as trees, domestic buildings	A landscape with small-scale fields/ variety in land cover, and presence of frequent human scale features such as trees, domestic buildings	An intimate landscape with a strong variety in land cover and containing numerous human scale features

Another way of evaluating sensitivity is to classify the landscapes by character and features as follows (North East Lincolnshire Council, 2015).

- High: Landscape areas of particularly distinctive or very positive character, with valued landscape features;
- High - Medium: Landscape areas of some distinctive or positive character, with some valued landscape features;
- Medium: Landscape areas of a reasonably positive character, with limited valued landscape features;
- Medium - Low: Landscape areas of some character, with few valued landscape features and evidence of some degradation of character or features;
- Low: Landscape areas of a weak character, with very few, if any, valued landscape features value and evidence degradation of character or features

South Tyneside Council (2012) classified the sensitivity to wind farms from low to high:

Characteristic	Lower sensitivity	◄►	Higher sensitivity
Landscape			
Land form & scale	Larger scale landform Simple, and lacking topographical variety		Smaller scale landform Distinctive and complex, with scale indicators and topographical variety
Land cover patterns	Simple and regular		Complex & irregular
Man-made influence	Developed areas Presence of infrastructure		Dispersed settlement pattern Relative lack of development Presence of historic settlement
Movement	Prominent movement, busy		Less evident movement, still
Visual			
Skylines	Simple skylines Existing vertical features		Complex skylines No existing vertical features
Intervisibility	Limited views in and out, a		Prospects in and out e.g. from high ground

	self-contained area	or open landscapes, a visible landscape
Landmark features	No landmarks	Prominent key landmarks

The Cumbria Wind Energy SDP defined a set of criteria for gauging sensitivity in regard to wind projects:

Key Characteristic	**Attributes indicating lower sensitivity to wind energy development**	↔	**Attributes indicating higher sensitivity to wind energy development**
Scale and Enclosure	Large scale landform/land cover/development featureless coarse grained open with broad views exposed.	↔	Small scale landform/land cover/development. Human scale indicators. Fine grained enclosed with narrow views sheltered.
Complexity and Order	Simple predictable ordered and hierarchical smooth and flowing geometric with linear features regular.	↔	Complex unpredictable confused and haphazard, rugged and intricate, organic with variable accents. Irregular mosaics.
Manmade Influence	Presence of utility, infrastructure or industrial elements. Contemporary structures e.g. masts pylons, cranes, silos, industrial sheds with vertical emphasis, functional manmade land use patterns and engineered aspects.	↔	Absence of manmade elements. Traditional or historic settlements, buildings and structures. Natural features and 'natural' forms of amenity parkland.
Skyline	Reposeful skylines. Simple predictable skylines. Existing vertical focal points. Discrete and well-ordered verticals in coherent pattern with landscape. Moderating features e.g. tiered horizons, low contrast with background.	↔	Distinctive landmark. Skylines complicated. Unpredictable skylines. Bare uncluttered horizons. Confusion of existing verticals of variable form and function. Intensifying features e.g. framed vistas, valley rims, channelled views.
Connections with Adjacent Landscapes	Gradual transitions in elevation Weak connections. Neighbouring landscapes of low sensitivity. Limited views into and out of landscape. Simple large scale backdrops.	↔	Sharp contrasts in elevation Contributes to broader scenic composition or setting. Neighbouring landscapes of high sensitivity. Prospects into and out from high ground or open edges Intricate or distinctive backdrops.
Remoteness and Tranquillity	Busy and noisy. Human activity and development. Prominent movement.	↔	Sense of peace and isolation. Remote and empty No evident movement
Visual			
Visual Interruption	Rolling topography. Frequent vegetative or built features.	↔	Flat or gently undulating topography Few if any vegetative or built features.
Settlement and Key Views	Unpopulated or sparsely populated. Concentrated pattern of large settlements. Introspective settlement Inaccessible Indistinctive or industrial settings.	↔	Densely populated. Dispersed pattern of small settlements. Outward looking settlement. Landscape focused recreation routes and/or visitor facilities. Distinctive settings, 'gateways' or public viewpoints.

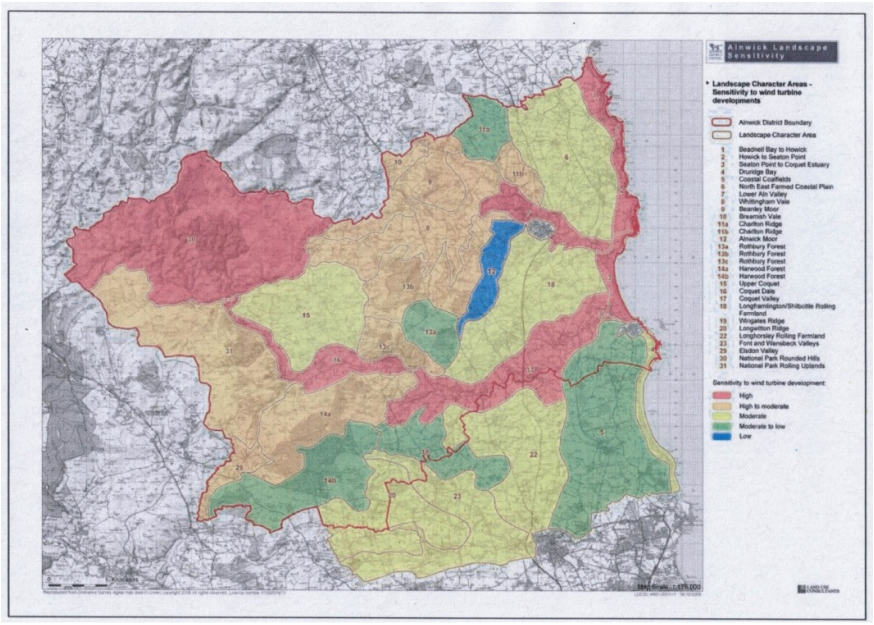
Cumbria County Council, 2007.

In Scotland, West Lothian Council (2011) identified the following as landscapes of the highest sensitivity.

Landscape Criterion	Areas of Highest Sensitivity
Landscape experience	Landscapes where people are likely to feel a particularly strong sense of solitude, remoteness and / or peacefulness / tranquillity, emptiness, naturalness or wildness and, apart from natural movements, such as wind and clouds, have little or no movement, and exhibit particularly strong sense of stillness or calmness
Land use and change	Landscapes with no obvious or extremely limited evidence of modern settlement, buildings, infrastructure or main roads, no or only very localised forestry plantations or intensive agriculture, obviously unspoilt, historic landscapes and inventory Designed Landscapes, landscapes with regionally or nationally important cultural heritage associations
Rarity (unusual / distinctive)	Landscapes with rare or unusual characteristics which retain their distinctiveness and merit protection in the interests of sustaining good representative examples of each landscape unit in West Lothian

Lancashire County Council (2005) and Rugby Borough Council (2011) classified the criteria into the following categories:

Physical: Landscape scale, openness, landform, skyline, land cover, complexity and patterns, and settlement type and pattern, vertical elements, movements (e.g. roads).
Perceptual: Sense of remoteness and wildness, perception of change (modern landscapes can accommodate change whereas ancient, unchanged landscapes or designed landscapes cannot).
Visual: Landscapes that form settings, skylines, backdrops and focal points, have strong visual features, views (landscapes that are visually contained or have limited views within/into/out of the area may provide greater opportunity to accommodate wind energy development than areas with extensive views within/into/out of area).
Value**:** Rarity of the landscapes, Designated scenic quality (National Parks, AONBs), cultural associations (historical, literary or artistic) relating to a landscape, popularity for amenity and recreation.
Figure 10 is an example of a map of landscape sensitivity to wind farm developments. The most sensitive landscapes are along the coast, along river valleys and in the remoter uplands. Lower sensitivity areas include industrial parts of the coastal plain, some upland moorlands, and an elongated ridge.



Northumberland County Council, 2009. *Alnwick- Plg for Renewable-Energy-SPD*
Red = high, orange = high to moderate, yellow = moderate, green = moderate to low, blue = low

Figure 10 Alnwick (Northumberland) Landscape Sensitivity

The capacity of the landscape to absorb change may be classified as follows (North East Lincolnshire Council, 2015):

- High: Potentially tolerant of significant change;
- High – Medium: Potentially tolerant of change;
- Medium: Potentially tolerant of some change;
- Medium - Low: Potentially tolerant of limited change;
- Low: Potentially tolerant of very limited change

A highly sensitive landscape will have a low capacity to absorb change. Conversely a highly tolerant landscape will have low sensitivity to change.

Landscape character areas may be classified by the amount of wind farm development (Torridge DC, 2011):

1. Landscape without wind energy development.
2. Landscape with very occasional wind energy development.
3. Landscape with occasional wind energy development.
4. Landscape with wind farm development.
5. A wind farm landscape

Cornwall Council (2016) had a similar classification but with only four categories.

In Wales, Blaenau Gwent Council (2015) defined three landscape objectives by the amount of development:

Objective 1 Landscape Protection. No change to the integrity and quality of landscape character within nationally designated landscapes. Typically no wind turbine development or very infrequent smaller scale wind turbine development.
Objective 2 Landscape Accommodation. In other landscapes, outside the strategic search areas (SSAs), to maintain the landscape character. Typically a landscape with occasional wind turbine developments.
Objective 3 Landscape change. Within the strategic search area, to accept landscape change. Typically a landscape with a notable number of wind farms.

In Scotland, the Aberdeenshire Council (2005) classified landscape sensitivity in three categories, high, medium and low. High sensitivity included important components of a particular character that are susceptible to small changes; valued and distinguished features; considered attractive and valued nationally and/or locally - e.g. National Park, National Scenic Areas, National Trust property, Green Belt (Forty National Scenic Areas have been designated in Scotland and are similar to England's AONBs).

Rotherham Metropolitan Borough Council (2015) evaluated the sensitivity of visual receptors, i.e. people, to wind farms:

Magnitude	Typical Criteria
High	• Viewers with a particular interest in their surroundings or with prolonged viewing opportunities. e.g. Promoted viewpoints, tourist and visitor destinations. • Ramblers/walkers on national/ regional routes/ trails, visitors to local beauty spots, whose attention or interest are likely to be focussed on the landscape. • Occupiers of residential properties with principal views of the development site.
Medium	• Viewers of the landscape whose attention or interest is likely to be distracted by their activity or other local activities such as water sports, fishing etc. e.g. outdoor recreation facilities, country parks. • Occupiers of residential properties with secondary views affected by the development.

	• Users of local public rights of way, viewers travelling through the landscape on surrounding roads/railway networks via public transport.
Low	• Viewers of the landscape whose attention or interest is likely to be only a passing interest, with their attention focussed elsewhere e.g. people at their places of work. • Occupiers of commercial or industrial buildings. • Motorists using surrounding road network/ major highways.

In Scotland, Inverclyde Council (2014) also included receptors amongst the criteria for assessing landscape sensitivity to wind farms. The most sensitive receptors are residents at home and in their community, and walkers and cyclists recreating in the landscape. Similarly, the Scottish Borders Council (2016) regarded the following as potentially sensitive visual receptors: residents, travellers on roads and railways, and visitors including walkers and cyclists.

The Aberdeenshire Council (2005) identified the magnitude of effect to visual receptors either indoors or outdoors by their distance from the development:

Magnitude	Definition
High	Receptor(s) are within 500 m of the development
Medium	Receptor(s) are between 500 m - 2 km from the development
Low	Receptor(s) are between 2 - 5 km from the development
Negligible	Receptor(s) are more than 5 km from the development

The wind turbine density in the landscape averages 9 MW/km^2 but this will change with technology (DECC, 2010). DECC suggest that a distance between turbines of 5 rotor diameters or a benchmark of 9 MW/km^2 – whichever results in the greater capacity deployment figure. The South Pennines study found an installed density of 2.59 MW/km^2 without changing the character of the landscape (Julie Martin Associates, 2014).

RENEWABLES/WIND ENERGY/LOW CARBON STRATEGIES AND STUDIES

These reports provided the basis for the SDPs and SGPs referred to earlier and their content was largely covered in the earlier review. Fifty of the 57 reports were prepared in England and seven in Wales, there were none in Scotland. Typically these reports examine the current local targets and carbon dioxide emissions and energy budget of the area including by renewables and then analyse the potential contribution of various forms of renewables and low carbon actions such as house insulation and heat pumps. Projections of the contribution of renewables over several decades are also provided.

CONCLUSIONS

The twin issues of landscape and renewables are significant among Britain's councils and a great deal of work and research has been expended to survey them and assess the potential for renewables, particularly wind farms.

Landscape character assessments have taken root strongly in England, but less so in Wales and Scotland where there appears to a stronger emphasis on landscape values. Reviews of LCAs indicate that they have been largely prepared by professionals and have a somewhat blinkered and rosy view of the landscape compared with residents. A greater public input into these reports would lessen their reliance on landscape professionals.

Several dozen assessments have been made of the sensitivity and capacity of the landscape *per se*, and a further 54 specifically related to wind farms. Sensitivity and capacity are generally scored on a low to high basis; a landscape that is sensitive to change will have low capacity, and vice versa. Some councils have also assessed the sensitivity of receptors, i.e. people to wind farms.

The SDPs and SGPs prepared by councils identified nearly 40 factors that need to be assessed in regard to wind energy projects and there should be greater consistency in the range of factors requiring assessment.

Issues include the separation distance between housing and turbines which ranges from 2 km in Scotland to 500 m in England – again greater consistency is needed. Other issues raised include the repowering of turbines, cumulative impacts of wind farms, and developments in the Green Belt. The effect of the motion of turbines on countryside peace and tranquillity is significant and should be assessed.

A review of existing turbines by a council found that they had significant adverse landscape and visual impacts including cumulative impacts which were increasing and were nearing the capacity of the landscape to absorb them.

While the borders of National Parks and AONBs are respected in not allowing wind farms, the future of Green Belts is less certain with some inroads already occurring and proposed.

REFERENCES

Aberdeen City Council, 2017. *Supplementary Guidance: Wind turbine developments*.

Aberdeenshire Council, 2005. *Use of wind energy in Aberdeenshire: Guidance for assessing wind energy developments Part 2.*

AECOM, 2010. *Renewable and low carbon energy technical study. Local Authorities in Hertfordshire.*

Blackburn with Darwen Borough Council & Eight Councils, 2013. *Landscape guidance for wind turbines up to 60m high in the South and West Pennines.*

Blaenau Gwent Council, 2015. *Planning guidance for smaller scale wind turbine.*

Brentwood Borough Council, 2014. *Renewable energy study.*

Bridgend Council, 2014. *SPG20 Renewables in the landscape*.

Butler, A. & A. Åkerskog, 2014. Awareness-raising of landscape in practice: An analysis of landscape character assessments in England. *Land Use Policy*, 36:1, 441-9.

Butler, A. & U. Berglund, 2014. Landscape character assessment as an approach to understanding public interests within the European landscape convention. *Landscape Research*, 39:3, 219-236, DOI: 10.1080/01426397.2012.716404.

Calderdale Borough Council, 2017*. Assessment of areas of suitability for wind development in Calderdale*. Land Use Consultants.

Carmarthenshire County Council, Pembrokeshire Coast National Park Authority and Pembrokeshire County Council, 2013. *Pembrokeshire and Carmarthenshire: Cumulative impact of wind turbines on landscape and visual amenity guidance.*

Centre for Sustainable Energy, nd. *Guidance Note: How to identify suitable areas for onshore wind development in your neighbourhood plan*

Cherwell District Council, 2011. *Planning guidance on the residential amenity impacts of wind turbine development.*

Cheshire East Council, 2013. *Landscape sensitivity to wind energy developments.*

Cheshire West and Chester Council, 2012. *Low carbon and renewable energy study.*

Civil Aviation Authority, 2016. *CAA Policy and guidelines on wind turbines* CAP 764. 6th ed.

Clackmannanshire Council, 2015. *Supplementary guidance 2: Onshore wind energy.*

Cornwall Council, 2016. *Annex 1: An assessment of the landscape sensitivity to on-shore wind energy & large-scale photovoltaic development in Cornwall.*

Council of Europe, 2000, *European Landscape Convention*, Florence.

Countryside Commission, 1987*. Landscape assessment, a Countryside Commission approach*. CCD 18.

Countryside Commission, 1993. *Landscape assessment guidance*, CCP 423.

Countryside Agency and Scottish Natural Heritage, 1999. *Interim landscape character assessment guidance.*

Countryside Agency and Scottish Natural Heritage, 2006. *Techniques and criteria for judging capacity and sensitivity landscape topic paper 6.*

Cumbria County Council, 2007. *Cumbria wind energy supplementary planning document Part 1 & 2*.

Department of Energy and Climate Change (DECC), 2010. *Renewable and low-carbon energy capacity methodology. methodology for the English regions*.

Dorset Council, 2010. *Dorset landscape change strategy*. Land Use Consultants.

Dorset Council, 2012. *Guidance for wind turbine development in the Dorset Area of Outstanding Natural Beauty (draft).*

Dumfries & Galloway Council, 2020a. *Wind energy supplementary guidance. Development Management considerations.*

Dumfries & Galloway Council, 2020b. *Wind energy Appendix C Landscape SG LDP2*.

East Ayrshire Council, 2015. *East Ayrshire Local Development Plan, background paper: sensitive landscape areas.*

East Hampshire District Council, 2018 *Renewable energy and low carbon study*. Land Use Consultants.

East Northamptonshire Council, 2014. *Wind and solar energy SDP.*

Falkirk Council, 2015. *Spatial framework and guidance for wind energy development*.

Fareham Borough Council, 2013 Renewable and low carbon energy capacity study. Parsons & Brinckerhoff.
Fenland District Council, 2009. *Wind turbine development policy guidance.*
Fines, K.D., 1968. Landscape evaluation: a research project in East Sussex. *Regional Studies*, 2, 41 - 55.
Gedling Borough Council, 2018. *Local planning document, Part 2 Local Plan*.
Gwynedd County Council, 2014. *Onshore wind energy.*
The Guardian, 2/3/2020. UK government lifts block on new onshore windfarm subsidies.
Harrogate Borough Council, 2018. *Harrogate district local plan: wind energy background paper.*
Hinckley and Bosworth Borough Council, 2014. *Renewable energy capacity study*.
House of Lords, Parliamentary Question: Wind Power, 22 July 2014
Inverclyde Council, 2014. *Landscape capacity study for wind turbine development in Glasgow and the Clyde Valley.*
Isle of Anglesey Council, 2013. *Onshore wind energy*.
Jackson, S., Fuller, D., Dunsford, H., Mowbray, R., Hext, S., MacFarlane R. and Haggett, C., 2008. *Tranquillity mapping: developing a robust methodology for planning support*, Report to the Campaign to Protect Rural England, Centre for Environmental & Spatial Analysis, Northumbria University, Bluespace environments & the Univ. of Newcastle upon on Tyne.
Jacobs, A.L., 2019. *UK Landscape policy, landscape character assessment and landscape impact assessment – intensions vs practical application*. Visual Resource Stewardship Conference. 8.
Julie Martin Associates and C. Swanwick, 2003. *Overview of Scotland's national programme of landscape character assessment*. Scottish Natural Heritage Commissioned Report F03 AA307.
Julie Martin Associates and LUC, 2014. *South Pennines wind energy landscape study.* Prepared for Rossendale, Burnley, Calderdale, Kirklees and Barnsley Councils.
Lancashire County Council, 2005. *Landscape sensitivity to wind energy development.*
Landscape Institute and Institute of Environmental Management and Assessment, 2013. *Guidelines for landscape and visual impact assessment.* 3rd Edition. Routledge.
Linton, D.L., 1968, The assessment of scenery as a natural resource. *Scottish Geographical Magazine*, 84:3, 219 - 238.
Lothian, A., 2017. *The Science of Scenery. How we see scenic beauty, what it is, why we love it, and how to measure and map it.* Amazon.
Melton and Rushcliffe Borough Councils, 2014. *Landscape sensitivity study: wind energy development.*
Ministry of Housing, Communities & Local Government (MHCLG), 2012. *National Policy Framework, 13. Protecting Green Belt Land.*
Natural England, 2010. *Making space for renewable energy. Natural England's approach to assessing on-shore wind energy development.*
North East Lincolnshire Council, 2015. *Landscape character assessment sensitivity and capacity study.*
North Somerset Council, 2014. *Wind turbines supplementary planning document.*
Northumberland County Council, 2009. *Alnwick planning for renewable energy SPD.*
Northumberland County Council, 2011. *Renewable energy, low carbon energy generation and energy efficiency study*.
Northumberland County Council, 2015. *Landscape and operational wind farms study.*
Northumberland County Council, 2015. *Assessment of the extent to which existing onshore wind developments in Northumberland have been successfully accommodated into the landscape.*
Pendle, Burnley, Rossendale, Calderdale, Kirklees Councils, 2010 *Renewable & low carbon energy study.*
Perth and Kinross Council, 2014. *Perth and Kinross local landscape designations review.* Land Use Consultants.

Robinson, D.G., I.C. Laurie, J.F. Wager & A.L. Traill, 1976. *Landscape evaluation, report of the landscape evaluation research project, 1970-75 for the Countryside Commission for England and Wales*. Centre for Urban and Regional Research, University of Manchester.

Roe, M., 2013. Policy Change and elc implementation: establishment of a baseline for understanding the impact on uk national policy of the European Landscape Convention, *Landscape Research*, 38:6, 768-798. DOI: 10.1080/01426397.2012.751968

Rotherham Metropolitan Borough Council, 2015. *Landscape and visual impact assessment.*

Rugby Borough Council, 2011. *Landscape capacity study for wind energy developments Parts A and B.*

Sarlöv-Herlin, I.S., 2016. Exploring the national contexts and cultural ideas that preceded the Landscape Character Assessment method in England, *Landscape Research*, 41:2, 175-185. DOI: 10.1080/01426397.2015.1135317.

Scottish Borders Council, 2016. *Renewable energy supplementary guidance*

Scottish Government, 2017a. *Scottish Energy Strategy, The future of energy in Scotland.*

Scottish Government, 2017b. *Onshore wind policy.*

Scottish Natural Heritage, 2012. *Assessing the cumulative impact of onshore wind energy developments.*

Scottish Natural Heritage, 2017a. *Siting and designing windfarms in the landscape*

Scottish Natural Heritage, 2017b. *Visual representation of wind farms*

Sell, S. & J. Carpenter, 2016. How applicants and communities are responding to new wind farm tests*. Planning*, 3 June.

Smith, L., 2016. *Planning for onshore wind*. House of Commons

Solihull Metropolitan Borough Council, 2010. *Renewable and low carbon energy resource assessment.*

South Kesteven District Council, 2013. *Wind energy SDP.*

South Lanarkshire Council, 2019. *Tall wind turbines landscape capacity, siting & design guidance*.

South Tyneside Council, 2012. *South Tyneside landscape character study: Part III Application of the character assessment.*

Staffordshire Moorlands District Council, 2015. *Wind turbine landscape sensitivity study.*

Stamps, A.E., 1999. Demographic effects in environmental aesthetics: a meta-analysis. *Journal of Planning Literature*, 14:2, 155 – 175.

Swanwick, C., 2002. *Landscape character assessment guidance for England and Scotland* Countryside Agency and Scottish Natural Heritage.

Tameside Metropolitan Borough Council, 2009. *Tameside countryside strategy*.

Telford & Wrekin Council, 2009. *Landscape sensitivity and capacity study.*

Tilley, J., 2015. Is onshore wind dead? *Planning*, 17 July

Torridge District Council, 2011. *Landscape sensitivity to onshore wind energy.*

Tudor, C, 2014. *An approach to landscape character assessment*. Natural England.

UK Govt. www.gov.uk/guidance/renewable-and-low-carbon-energy#shadow-flicker-and-reflected-light

Welsh Assembly, 2005. *Planning policy Wales, technical advice note. 8: Planning for renewable energy.*

West Lancashire Borough Council, 2019. *West Lancashire low carbon & renewable energy study.*

West Lothian Council, 2009. *West Lothian local plan* (superseded).

West Lothian Council, 2011*. Landscape capacity study for wind energy development.*

Yorkshire Dales National Park Authority, 2002. *Yorkshire Dales National Park landscape character assessment.*