The Economic Contribution of the National Forest Estate

A Final Report by Hatch Regeneris
November 2018

Forest Enterprise Scotland

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www.hatchregeneris.com

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Executive Summary

i. Hatch Regeneris and 4 Consulting have been appointed to provide an updated assessment of the National Forest Estate's economic contribution in Scotland. The National Forest Estate (NFE) is managed by Forest Enterprise Scotland (FES) on behalf of Scottish Government Ministers.

ii. The report estimates the economic contribution of the NFE in Scotland for 2017/18 in terms of Full Time Equivalent (FTE) jobs and Gross Value Added (GVA) using a range of data inputs provided by FES. The assessment covers the following sources of economic contribution:

- Direct effects (i.e. income and employment within Forest Enterprise)
- Indirect effects driven by supply chain linkages in Scotland (*backward linkages*)
- Induced effects from the expenditure of direct staff and those in the supply chain
- A set of selected *forward linkage* effects linked to the outputs of the NFE (timber processing, deer management and renewables)
- Visitor economy spillover effects.

iii. The results are set out below, for each type of impact in turn.

Summary of results

iv. The table below shows the results of the assessment and compares them to those for 2012/13. Bringing together all of the above analysis suggests that in 2017/18 the National Forest Estate supported a total of **10,255 FTEs and £410m in GVA** for Scotland. This implies that the overall economic contribution has remained roughly unchanged since 2012/13, albeit with some shifts in the composition of this contribution between the different sources.[1]

FTEs supported by Scotland National Forest Estate, 2017/18 and 2012/13			
	2012/13	2017/18	Change
Direct	886	845	-41 (-5%)
Indirect	1,628	1,030	-330 (-20%)
Induced		265	
Timber harvesting, processing and haulage	3,994	4,050	+50 (+1%)
Deer management	35	40	+5 (14%)
Renewables			
- Wind	681	540	-141 (-21%)
- Hydro	n/a	265	n/a
Visitor economy spillovers (indicative additional)	3,030	3,220	**+190 (+6%)**
Total	**10,255**	**10,255**	**-**

Source: Hatch Regeneris calculations

[1] The figures are not directly comparable due to the addition of hydro power to the 2017/18 figures, which was not covered previously. Excluding this, there has been 2.6% drop in FTEs supported.

Direct effects

v. The NFE supports 1,010 people in direct employment, equivalent to **845 FTEs**. This compares to the 886 FTEs that were recorded in 2012/13: a 5% reduction. The associated direct GVA is estimated at **£38 million** (in 2017/18 prices).

Indirect/supply chain effects

vi. In 2017/18 FES spent a total of £78.9 million externally. 82% was spent with suppliers based in Scotland. This compares to £81.3 million in the 2012/13 assessment, a 3% drop in nominal terms.[2]

vii. We estimate that this expenditure supports a total of **1,030 FTEs and £45 million in GVA** for Scotland, excluding induced effects.

Induced effects

viii. As direct and indirect employees spend their wages and salaries, this supports further economic activity in Scotland. We estimate that induced expenditure supports a total of **265 FTEs and £20 million in GVA** in Scotland

ix. A comparison of the direct, indirect and induced effects across years is provided below.

FTEs supported by Scotland National Forest Estate, 2017/18 and 2012/13

	2012/13	2017/18	Change
Direct	886	845	-41 (-5%)
Indirect	1,628	1,030	-330 (-20%)
Induced		265	
Total	**2,515**	**2,140**	**-375 (-15%)**

Source: Hatch Regeneris calculations

Forward linkages

Timber processing

x. FES received £68.1 million in income from timber production, planting and forest management, a 30% increase in nominal terms on 2012/13. This is primarily driven by the 29% increase in the unit price per m^3 despatched. The actual volume despatched has increased by 3%.

xi. The previous study found that the NFE supported 3,994 FTEs (direct, indirect and induced) in timber harvesting, haulage and primary processing. Using the increase in volumes as the main driver of any increase in employment and adjusting for the marginal increase in headline labour productivity over time (1.7% in real terms), [3] implies an increase factor of

[2] After headline inflation of 8% over the period (Source: HM Treasury GDP Deflators) this implies a real-terms fall of around 11%.

[3] Source: Scottish Government Labour Productivity Statistics https://www.gov.scot/Topics/Statistics/Browse/Economy/PROD18Q1

1.3%. Hence the NFE supported an estimated **4,050 FTEs** in 2017/18, an additional c.50 FTEs since the previous assessment. The associated GVA is estimated at £125m.[4]

Timber Processing Activity enabled by the NFE, 2017/18			
	2012/13	2017/18	Change
FTEs	3,994	4,050	1%

Source: FES and Hatch Regeneris calculations

Deer management

xii. FES income from deer management has grown to £1.998 million in 2017/18, an increase of 20% in nominal terms since 2012/13. After adjusting for headline inflation and labour productivity growth as above, this implies that FES supported **40 FTEs** in deer management in Scotland in 2017/18, with an associated GVA of £1.6m.[5]

Deer Management activity enabled by FES, 2017/18			
	2012/13	2017/18	Change
Income (£m)	1.667	1.998	20%
FTEs supported	35	40	10%

Source: FES and Hatch Regeneris calculations

Renewables

xiii. Data from FES shows that in 2017/18, a total of 77 MW of additional wind farm capacity was added on the estate, taking total operational capacity to 1,037 MW. Applying the same coefficients as in the previous study shows that this supported a total of **540 direct, indirect and induced FTEs** with an associated £34m in GVA.[6]

xiv. The change between the two years is summarised below. The number of jobs estimated to be supported in development and construction has fallen, given the slower rate of new capacity development in the year compared to in 2012/13. The increase in installed capacity on the sites since 2012/13 implies more jobs in operations and maintenance. However, the employment coefficient is relatively low for operations and maintenance: hence, in 2017/18 the overall number of jobs supported is around a fifth lower than in 2012/13.

FTEs supported by National Forest Estate in Onshore Wind in Scotland, 2012/13 and 2017/18			
	2012/13	2017/18	Change
Development and construction	440	160	-280 (-64%)
Operations and maintenance	105	280	175 (167%)
Total (direct and indirect)	**545**	**440**	**-105 (-19%)**
Total (direct indirect and induced)	**681**	**540**	**-140 (-21%)**

Source: Hatch Regeneris calculations

[4] Based on GVA per Job estimate of £30,000 from ONS data on the Forestry and Logging Sector (SIC 02) in Scotland updated to current values using a GDP Deflator from the statistics.gov.scot website; ONS, BRES, 2016; ONS, GVA (Balanced), 2016.

[5] Based on GVA per Job estimate used in the previous study updated to current values using a GDP Deflator from the statistics.gov.scot website

[6] Based on Nation/Region GVA per Job Ratio of £63,200 from Renewables UK, Onshore Wind: Economic Impacts, 2015 updated to current values using a GDP Deflator from the statistics.gov.scot website

xv. The NFE also hosts hydro power installations. Whilst there are a number of hydro schemes, they are much smaller on average in capacity terms: at July 2018 the total operational hydro capacity was 48 MW, an addition of 7 MW in the year. We estimate that this supported **265 direct, indirect and induced FTEs** in Scotland in 2017/18, with an associated £16.7m in GVA.[7]

Visitor-related

xvi. Since the previous assessment, the total number of annual visits to the NFE has risen by 14%. We estimate that:

- The NFE had a total visitor economy **contribution** of 4,166 FTEs and £170 million in GVA
- Taking account of additionality of visits from Scotland residents,[8] the total economic **impact** amounted to 3,220 FTEs and £128 million in GVA.

xvii. Overall, then, the visitor economic contribution of FES has risen by around 10% since 2012/13.[9] A comparison between years is provided below.

Visitor Related Impacts, 2017/18 and 2012/13

	2012/13 results			2017/18 results		
	Spend per job	Jobs (FTEs)	GVA (£m, 2012 prices)	Spend per job (2017/18 prices)	Jobs (FTEs)	GVA (£m, 2017/18 prices)
Other UK and overseas	£34,560	2,560	71.6	£45,850	2,718	108
Scottish overnight	£34,630	943	26.6	£46,300	993	40
Scottish day trips	£59,500	284	11.3	£52,350	455	19
Total	**£37,630**	**3,790**	**109.6**	**£46,700**	**4,166**	**167**
Indicative additional	**-**	**3,030**	**85**	**-**	**3,220**	**128**

Source: Hatch Regeneris calculations

Note: Uses the latest available visits data for 2016.

[7] Based on Nation/Region GVA per Job Ratio of £63,200 from Renewables UK, Onshore Wind: Economic Impacts, 2015 updated to current values using a GDP Deflator from the statistics.gov.scot website

[8] This assumes 50% additionality of Scottish overnight visitors and 0% additionality for Scottish day visitors, as was assumed in the previous study.

[9] The increase in economic impact is lower than the increase in the number of visits because we have excluded from our calculation the impacts associated with admissions charges. As discussed with the Forestry Commission, this is in order to avoid double counting with the direct, indirect and induced impacts shown earlier (a portion of which will be supported by these admissions receipts). It is also possible that some of the direct jobs are also supported by visitor spend on retail on the sites, but it is not possible to know this from the data.

1. Purpose of the report

1.1 Hatch Regeneris and 4-Consulting have been appointed by the Forestry Commission to provide an economic impact assessment of the National Forest Estate (NFE), which is managed by Forest Enterprise Scotland (FES).

1.2 The purpose of the work is to update the previous estimates that were produced for 2012/13[10] for the 2017/18 financial year. The report covers the range of attributable contributions to the Scottish economy, including:

- direct effects
- supply chain effects (backward linkages)
- induced effects arising from the expenditure of direct staff and those in the supply chain
- selected forward linkage effects (from activities that purchase NFE products as an integral, key input), including timber processing, deer management and renewables
- visitor economy spillovers.

1.3 The principle in updating the figures has been to replicate the previous approach where it is feasible and appropriate to do so, and to adjust the method in agreement with FCS where it adds to the robustness of the assessment.

1.4 The report is structured as follows:

- Section 2 outlines our economic impact assessment framework
- Section 3 sets out the results emerging from the economic modelling.

[10] CJC Consulting (2015) *The economic contribution of forestry and other activities on Scotland's National Forest Estate*

2. Economic impact framework

2.1 This section reproduces our economic impact framework, which we agreed in consultation with the Forestry Commission.

Types of impact

2.2 The framework covers the following impacts:

- **Direct Impacts:** these are the contributions that are made to the economy as a result of direct on-site and administrative activities linked to the NFE
- **Backward Linkages (Suppliers):** these are the economic contributions made in the supply chain and through increased employee expenditure.
- **Forward Linkages (Purchasers)/wider effects:** these are the attributable impacts enabled within key economic actors that use outputs from the NFE as an input.

Measures of impact

2.3 The most commonly used measures of economic impact are employment and Gross value added (GVA):

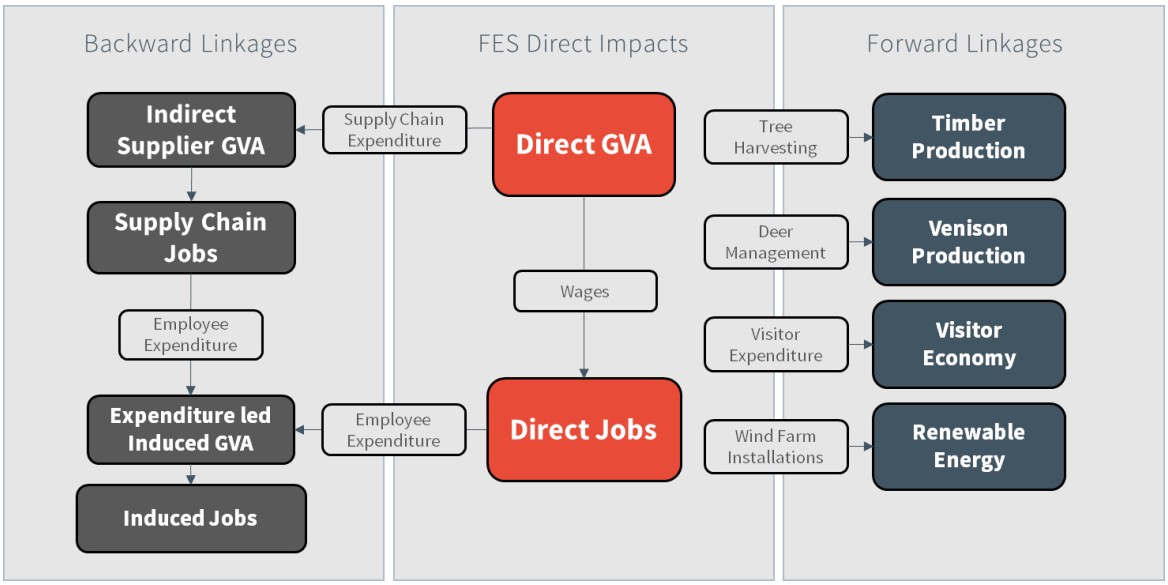
- **Employment:** this is the number of people employed and is measured in Full Time Equivalent Jobs (FTEs).
- **GVA:** this is the additional value to the economy and is broadly equivalent to the total employment costs plus a measure of net profits.

2.4 Where other measures of economic impact are used, they are defined in the relevant sections.

2.5 As was the case for the previous study, this excludes the assessment of non-market benefits such as biodiversity, recreation, landscape, and pollution absorption.

2.6 The diagram below provides an overview of the types of impact covered and the nature of the forward and backward linkages. The subsequent sections then explain these in turn, along with the proposed method and data sources used for estimating them.

Figure 2.1 FES Impact Overview



Source: Hatch Regeneris

Direct Contribution

2.7 Direct impacts are those that are created by the NFE and its employees in the workplace.

Employment Impacts

2.8 The total direct employment impact includes FES employees as well as a number of FCS employees whose work activities are specifically related to the NFE. Direct employment has been provided by the Human Resources Department at FES, both in terms of the total number of employees and on a Full Time Equivalent basis. Shared Services staff have also been allocated in the data.

2.9 This is the same approach that was taken in the previous study, albeit with updated figures.

Gross Value Added

2.10 GVA is broadly equivalent to total employment costs plus a measure of net profit before depreciation and amortisation. GVA within private organisations is relatively easy to estimate as the information can be derived from annual accounts. For the NFE activities this is complicated by two main factors. FES is a public body and therefore although it generates surpluses these do not count as profits as such. Also, since FES is tied into a number of other public bodies such as the Forestry Commission, it is difficult to strip out FES specific financial data.

2.11 As such, GVA has been estimated by applying benchmarks on GVA per FTE to the employment estimates. National statistics on GVA and employment in the forestry industry are available, although this tends to be patchy as the sector itself is difficult to define using the Standard Industrial Classification (SIC) Codes used by the Office for National Statistics (ONS). For this reason, it is more appropriate to rely on data from specific forestry sector studies.

2.12 The Forestry Commission has pointed out that, strictly speaking, not all of FES employees will fall under the forestry sector SIC code: some are best classed under public administration. We agreed to classify all staff based in districts outside Edinburgh and Inverness as working in Forestry and the rest as in public administration.

Backward Linkages

2.13 Backward linkages are the impacts that are generated within FES's supply chain and through employee expenditure. These are categorised into two impact types:

- **Indirect:** these are the impacts generated by companies in FES's supply chain as purchases made by FES support employment and economic activity within its suppliers, as well as further multiplier effects throughout lower tiers of the supply chain.
- **Induced:** this is the impact arising from expenditure made by direct employees and those within the supply chain, as employees spend wages in the local economy and this flows throughout the economy.

Indirect

2.14 Modelling the indirect impacts involves estimating the first-round impacts from FES expenditure on suppliers as well as the subsequent multiplier effects taking pace within Scotland. We considered a number of options for doing this.

2.15 In the previous study, there was a three-tiered approach to obtaining supplier data to model impacts.

1) All FES suppliers were surveyed to obtain information on employment and turnover at the source. Where a response was obtained, the information on their turnover and employment was used to estimate the employment supported within these firms from their sales to FES.

2) For suppliers that did not respond to the survey, information from the Inter Departmental Business Register (IDBR) from the Office for National Statistics (ONS) was used to derive data on the turnover and employment for the overall business. This involved identifying individual suppliers within the IDBR, where possible, and pulling out data on their employment and turnover.

3) For the remaining suppliers that could not be matched to the IDBR, the mean average turnover-employment ratio for the forestry industry as a whole was applied.[11]

2.16 Multipliers from the Scottish Input-Output tables were then used to estimate the indirect effects beyond this initial first round of expenditure.

2.17 We agreed at the tender stage that repeating a survey of suppliers was not necessary for this update (given the likely response rate and the time and resource implications). After considering the merits of using IDBR data, we concluded that it is not a worthwhile option for this exercise, for the following reasons:

- IDBR data contains UK level turnover and employment in many instances rather than for Scottish specific sites. Hence in these cases the data is of limited use in estimating employment.
- Coverage of businesses in the IDBR is generally patchy, meaning there would be a significant number of missing figures.
- Lead-in times to access the IDBR are significant (a minimum of 6 weeks).

2.18 Given these factors, we have concluded that it is more efficient and effective to match suppliers to SIC codes and then to use sector-level data for Scotland from ONS. This involves two steps:

1) We have developed an efficient approach which matches supplier data from FES's purchasing team to data contained in Companies House on the individual companies. This uses *fuzzy matching* to account for inaccuracies in supplier records where companies have been recorded with a name that is not exactly the same as that registered with Companies House. This enables us to group suppliers, and expenditure, into sectors of the economy using Standard Industrial Classification (SIC) Codes.

2) Once the sectors have been identified we can run the expenditure data through the latest Scottish Input-Output tables to generate indirect employment and GVA estimates. This can be done using the Type 1 employment and GVA effects for the relevant sectors. This enables us to estimate the impacts generated in a supply chain, not only with FES's immediate suppliers but also those further down the supply chain.

2.19 Hence, although some aspects of the method for allocating suppliers to SIC codes are a little different, the fundamentals of the impact methodology remain the same as last time.

[11] CJC Consulting, The Economic Contribution of the Forestry Sector in Scotland, 2015

Induced

2.20 Induced effects arise from the spending of FES employees and those in the supply chain. The previous assessment estimated this by applying Scottish Government Type II multipliers to the direct employment and that of the first-round indirect expenditure effects and then netting off the Type I effect to arrive at the induced effect.

2.21 There are two possible methods that we could use to estimate the induced impacts of direct FES employees:

1) Apply the Type II multipliers from the Scottish Input Output tables to the direct employment to provide an estimate of direct, indirect and induced impact. Then the direct and indirect are taken away to leave just the induced impacts.

2) Use the data held by FES's HR department on employment costs to estimate the induced effects resulting from staff expenditure. This involves some application of benchmark assumptions to account for items such as taxes, and savings to estimate disposable income and then the application of Type II multipliers to the disposable income. To model the impact of expenditure by employees within the supply chain, we will use benchmark estimates from the Scottish Input Output tables. The sum of the two elements of induced impact will represent the total induced impact. This has the advantage of being directly related to wage and employment cost data from FES.

2.22 Based on feedback from FC we have agreed to apply option 2 as it is more robust. We have assumed that two-thirds of net pay is spent in Scotland and that staff on average contribute 5% into their pensions.[12] This methodological adjustment should be borne in mind when interpreting changes since the previous assessment.

Forward Linkages/ Wider Impacts

2.23 Forward linkage effects refer to the activity enabled within those organisations for which NFE outputs are integral to their own production process, i.e. land, timber and livestock outputs. In line with the approach used in the previous assessment, the main elements that we have modelled are:

- **Timber processing:** impacts generated through the harvesting of trees and other forest related production
- **Deer management:** impacts generated through the processing of venison
- **Renewables:** renewable energy generated on NFE sites
- **Visitor related:** impacts on the visitor economy related to visits to NFE sites.

2.24 **Note that indirect and induced impacts are dealt with differently for each of the forward linkages and as such are covered under each impact type.**

[12] The latest Input-Output tables published by the Scottish Government in 2018 show household spending on domestic (Scottish) produced goods and services accounted for 67% of spending by households in Scotland. One third (33%) was spent on imports from abroad or other parts of the UK.

Timber Processing

2.25 Timber from the Estate is used by the processing, harvesting and haulage industries in Scotland. Hence a portion of employment in these sectors, as well as in their supply chain, can be attributed to the NFE.

2.26 The previous assessment modelled this by applying the proportion of NFE-related output of timber in Scotland to the total economic contribution (direct, indirect and induced) associated with timber processing from the 2012/13 based Scotland forestry sector study. It then added on the proportion of employment in associated activities (harvesting and transport), including indirect and induced impacts.

2.27 Given there has not been a subsequent update to the forestry sector study, to estimate the contribution from primary timber processing for 2017/18, we proposed two options to updating the NFE impacts:

1) Apply the real terms growth in income from timber processing provided by FES's finance team to the impact figures shown in the 2012/13 study.

2) Apply the growth in the volume of timber dispatched to the impact figures from the previous study. This was the approach taken in the annex to the previous study to update the analysis to 2013/14.

2.28 Based on feedback from the Forestry Commission, we have adopted method 2 as the most appropriate approach.

Deer Management

2.29 Deer management is an important element of NFE activities, particularly in protecting the Estate from damage. The processing of carcasses sold by FES and recreational shooters helps to sustain and generate impacts in the venison industry.

2.30 The previous assessment modelled this impact by contacting individual processors to ascertain direct employment estimates associated with the deer management activities. A multiplier was then applied to the direct estimate to obtain an estimate of indirect and induced impacts.

2.31 We have agreed to use the previous study's estimate of employment supported by deer management as a starting point. To estimate how this has changed, we have applied the real growth rate in FES income (adjusted for productivity growth as above) related to deer management in the period 2012/13 to 2017/18 to provide an estimate of the current employment supported.

Renewables

2.32 FES leases land for renewable energy developments including both wind and hydropower. These developments sustain significant levels of employment, both during construction and to a lesser extent, operations and maintenance.

2.33 The previous assessment modelled this using benchmarks on total jobs (direct, indirect and induced) supported per MW of energy output from the 2015 RenewableUK report on Wind energy.[13] Given the relatively small amount of other types of renewable energy development, the study focused exclusively on wind energy.

[13] RenewableUK, Onshore Wind: Economic Impacts in 2014, 2015

2.34 To estimate the impact of wind developments on the estate, we have applied the same benchmarks from the previous study as these remain the latest robust estimates for Scotland. More recent estimates have been produced such as the 2017 ScottishPower Renewables study[14] but they are not as comprehensive or robust as the RenewableUK study. We have applied the benchmarks to updated data on the level of wind energy development from July 2018 to provide an up to date picture of the most recent impacts.[15]

2.35 The Forestry Commission has pointed out that although the MW capacity in hydro power on the estate is small, in terms of total sites it is more significant. We have therefore applied evidence on the jobs per MW for hydro, although the evidence available to do this is less robust. We were not able to source any evidence for Scotland but there is evidence on employment coefficients for community hydro in Wales, which provides a very rough indication of what the level of employment supported might be in Scotland.[16] We have applied these coefficients to the capacity on NFE sites.

Visitor Related

2.36 The NFE attracts a significant number of visitors each year. These visitors' off-site expenditure generates substantial impacts throughout Scotland's tourism economy on items such as hotels and other accommodation, travel, and food and drink.

2.37 The previous assessment modelled this using survey evidence. The 2013 All Forest Survey was used to estimate expenditure by type of visitor and expenditure item. The study focuses on the impacts of visitors from outside Scotland and Scottish overnight visitors and excludes Scottish visitors on day trips as a large proportion of this is likely to displace expenditure on other items in the Scottish economy.

2.38 Expenditure is then converted into employment using benchmark turnover per job ratios for each expenditure type derived from the Inter Departmental Business Register after accounting for multiplier effects from the Scottish Government Input Output tables. Direct GVA is then calculated using data from 2012 Scottish Annual Business Statistics on GVA per £ expenditure by expenditure category. Total GVA is estimated by applying multipliers from the Scottish Input Output tables.

2.39 The All Forest Survey from 2013 used in the previous study remains the latest detailed survey of visitors to the estate. However, FES collects data on total visitors to the estate each year. We proposed two approaches to updating the estimates:

- apply the growth rate in the number of visitors from FES's annual visitor data to the total impacts estimated in the previous study to provide an updated estimate of visitor impacts
- apply the growth rate to the first-round estimate of direct tourism expenditure and then use updated estimates of turnover per job and GVA per job from the Scottish Annual Business Survey as well as multipliers from the most up to date Scottish Input Output tables.

2.40 From feedback from the Forestry Commission, we have used Option 2. This approach implicitly assumes that the origin, composition and spending patterns of visitors has not shifted significantly since 2012/13. In the absence of further information, this is a necessary simplifying assumption.

[14] Economic benefits from onshore wind farms, ScottishPower Renewables, 2017

[15] https://scotland.forestry.gov.uk/images/corporate/pdf/Renewable-energy-schemes-on-the-National-Forest-Estate---July-2018.pdf

[16] *The Economic and Social Impact of Small and Community Hydro in Wales*. This indicates that there are 5.5 FTE jobs supported per MW in the combined planning, development and operational phases in Wales

2.41 Care has been taken here where visitor expenditure has already contributed to FES impacts and could be double counted. We have therefore removed visitor expenditure on admissions from the calculation.

Summary of assessment approach

2.42 Table 2.1 brings all of this together to summarise the assessment approach. This also highlights where changes in results will be driven by changes in the fundamental drivers of impact as well as adjustments to the methodology.

Table 2.1 Summary of Economic impact framework

Source of impact	Previous approach	Proposed approach for 2017/18
Direct	Use data from FES's HR department and benchmark data on GVA per worker for forestry sector	Same approach with updated benchmarks and HR data, except some staff treated as public admin for GVA calculation. **2013-17 change driven by change in direct employment. GVA change driven by change in employment and change in productivity benchmarks.**
Indirect/ supply chain	Surveyed suppliers and filled gaps with IDBR data, then applied multipliers to supplier impacts	Match suppliers to SIC codes and then apply industry benchmarks and updated multipliers to generate impacts. **2013-17 change driven by change in value and pattern of supply chain expenditure, and updated multipliers from Scottish input-output tables.**
Induced	Applied Scottish Government multipliers to direct employment and first round expenditure impacts.	Estimate direct employee expenditure from FES HR data and then apply multipliers to estimate further rounds of induced impact. Induced effect from supplier spend calculated via Type 2 less Type 1 effect above. **2013-17 change driven by change in value and pattern of supply chain expenditure, change in direct employment and adjustment in induced calculation.**
Timber processing	Apportions impacts from the Forestry sector study	Apply growth in timber output to previous impacts, adjusted for productivity. **2013-17 change driven mainly by change in volume of timber .**
Deer management	Surveyed deer processors and then applied multipliers	Apply growth in deer management related income to previous impacts. **2013-17 change driven mainly by change in income from deer management.**
Renewables	Applies onshore wind energy industry jobs per MW benchmarks to MWs onshore wind energy developed on the Estate	Apply previous study's benchmarks to updated MWs figures, plus add in hydro power **2013-17 change driven mainly by change in level of renewable energy development plus addition of hydro.**
Visitor-related	Applies industry benchmarks and multipliers to split of tourism expenditure provided by FES Survey of visitors	Apply growth in overall visitor numbers to first round tourism expenditure and then apply updated benchmarks and multipliers to the updated visitor expenditure by category. **2013-17 change driven by visitor numbers and updated published multipliers for Scotland.**

3. Results

3.1 Here we set out the results from the analysis, applying the framework in Section 2.

Direct effects

3.2 The HR department has provided us with total staff numbers at FES as well as the relevant Shared Services staff . This indicates that FES supports a total of 891 people in direct employment, equivalent to **845 FTEs**. A breakdown is provided below, for 2017/18. This compares to the 886 FTEs that were recorded in 2012/13: a 5% reduction on the 2012/13 figures.

Table 3.1 FES Direct Employment, 2017/18

	Headcount			FTE		
	FES	Shared services	Total	FES	Shared services	**Total**
Edinburgh and Inverness	158	39	197	151	35	186
Elsewhere in Scotland	694	-	694	659	-	659
Total	**852**	**39**	**891**	**810**	**35**	**845**

Source: FES

3.3 Applying the GVA per FTE benchmarks discussed earlier implies that this supports **£38 million** in direct GVA (in 2017/18 prices) in Scotland.

Supply chain effects

3.4 The purchasing data provided by FES shows that in 2017/18 they spent a total of £78.9 million externally. This includes supply chain purchases recorded through the purchase ledger as well as credit card expenditure and staff travel and subsistence expenses. Of the £72.6 million in expenditure recorded in procurement data, 82% was spent with suppliers based in Scotland.

3.5 This compares to £81.3 million of external expenditure in the 2012/13 assessment, representing a 3% nominal drop.[17]

3.6 The top five items of spend in Scotland by SIC code (covering almost 75% of all spend) are shown below.

Table 3.2 Top Five Items of Spend in Scotland by SIC code, 2017/18

SIC	Description	% of Matched Spend in Scotland
02.1, 02.4	Forestry planting	30%
41-43	Construction	17%
82	Business support services	14%[18]
02.2-3	Forestry harvesting	10%
1.00	Agriculture	5%

Source: Hatch Regeneris calculations based on FES data

[17] It should be noted that the real terms reduction in spend will be greater than this, given inflation over the period.

[18] Covered under this SIC code are items such as contracts for planning, property management and legal advice

3.7 By applying the relevant sectoral Type 1 effects from the latest published Scottish Input-Output tables for 2015, we find that this expenditure supports a total of **1,030 FTEs and £45 million in GVA** for Scotland.

Induced effects

3.8 Using the data on direct salaries to model employee expenditure impacts, along with the results of the supply chain expenditure modelling, gives us the total induced effect from the NFE. This modelling shows that the total induced economic impact from the NFE for Scotland was **265 FTEs and £20 million in GVA** in 2017/18.

3.9 The previous assessment reported a total of 1,628 indirect and induced FTEs. Hence, comparing this to the 1,300 indirect and induced FTEs from this current assessment suggests a fall of 20% in the indirect and induced effects.

3.10 A comparison of the direct, indirect and induced results across years is provided below.

Table 3.3 Direct, Indirect and Induced FTEs supported by Scotland National Forest Estate, 2017/18 and 2012/13

	2012/13	2017/18	Change
Direct	886	845	-41 (-5%)
Indirect	1,628	1,030	-330 (-20%)
Induced		265	
Total	**2,515**	**2,140**	**-375 (-15%)**

Source: Hatch Regeneris calculations

Forward linkages

Timber processing

3.11 The previous study concluded that the NFE supported a total of 3,994 FTEs in timber harvesting, haulage and primary processing in Scotland through direct, indirect and induced effects. Data from the 2017/18 accounts shows that FES received £68.1 million in income from timber production, planting and forest management, a 30% increase in nominal terms on 2012/13. Further investigation of the data shows that this is primarily driven by the increase in the unit price per m^3 despatched, which has increased by 29%. The actual volume despatched has increased only marginally (by 3%).

3.12 After discussing with the Forestry Commission, we have used the increase in volumes as the main driver of any increase in associated employment. Having adjusted this for the marginal increase in headline labour productivity (output per job) over time (1.7% in real terms), [19] this implies an increase factor of 1.3%.

3.13 Using this approach, FES supported an estimated **4,050 FTEs** in 2017/18, implying an additional c.50 FTEs supported since the previous assessment. The associated GVA is £125m.[20]

[19] Source: Scottish Government Labour Productivity Statistics https://www.gov.scot/Topics/Statistics/Browse/Economy/PROD18Q1

[20] Based on GVA per Job estimate of £30,000 from ONS data on the Forestry and Logging Sector (SIC 02) in Scotland updated to current values using a GDP Deflator from the statistics.gov.scot website; ONS, BRES, 2016; ONS, GVA (Balanced), 2016.

Table 3.4 Timber Processing Activity enabled by the NFE, 2017/18			
	2012/13	2017/18	Change
FTEs	3,994	4,050	1%

Source: FES and Hatch Regeneris calculations

Deer management

3.14 The NFE supported an estimated 35 direct, indirect and induced FTEs in deer management in 2012/13, with an associated £1.67 million in income to FES in that year. FES Accounts for 2017/18 show that this income had grown to £1.998 million in 2017/18, an increase of 20% in nominal terms. After adjusting for headline inflation and labour productivity growth as above, the increase factor we have applied to the job numbers in 2012/13 is 10.02%.

3.15 This implies that the NFE supported **40 FTEs** in deer management in Scotland in 2017/18, with an associated GVA of £1.6m.[21]

Table 3.5 Deer Management activity enabled by the NFE, 2017/18			
	2012/13	2017/18	Change
Income (£m)	1.667	1.998	20%
FTEs supported	35	40	10%

Source: FES and Hatch Regeneris calculations

Renewables

3.16 The 2012/13 analysis showed that the NFE supported a total of 681 FTEs in the onshore wind sector in Scotland (direct, indirect and induced).

3.17 Data supplied to us shows that in 2017/18, a total of 77 MW of additional wind farm capacity was added on the estate, with a total operational capacity at the end of the year of 1,037 MW. Applying the same coefficients as in the previous study shows that this supported a total of 440 direct and indirect FTE jobs in Scotland through the development, operation and maintenance of wind farms.

3.18 Applying the same induced multiplier as previously implies that the total direct, indirect and induced jobs supported in Scotland amounted to **540 FTEs** with an associated £34.1m in GVA.[22]

3.19 The change between the two years is summarised below. The number of jobs estimated to be supported in development and construction has fallen, given the slower rate of new capacity development in the year compared to in 2012/13. The increase in installed capacity on the sites since 2012/13 implies more jobs in operations and maintenance. However, the employment coefficient is relatively low for operations and maintenance: hence, in 2017/18 the overall number of jobs supported is around a fifth lower than in 2012/13.

[21] Based on GVA per Job estimate used in the previous study updated to current values using a GDP Deflator from the statistics.gov.scot website

[22] Based on Nation/Region GVA per Job Ratio of £63,200 from Renewables UK, Onshore Wind: Economic Impacts, 2015 updated to current values using a GDP Deflator from the statistics.gov.scot website

Table 3.6 FTEs supported by National Forest Estate in Onshore Wind in Scotland, 2012/13 and 2017/18

	2012/13	2017/18	Change
Development and construction	440	160	-280 (-64%)
Operations and maintenance	105	280	175 (167%)
Total (direct and indirect)	**545**	**440**	**-105 (-19%)**
Total (direct indirect and induced)	**681**	**540**	**-140 (-21%)**

Source: Hatch Regeneris calculations

3.20 The NFE also hosts hydro power installations. Whilst there are a number of hydro schemes, they are much smaller on average in capacity terms: at July 2018 the total operational hydro capacity was 48 MW, an addition of 7 MW in the year.

3.21 As noted in Section 2, although there is less evidence on the per MW employment coefficients for hydro power we have applied the evidence from Wales. This suggests that **265 FTEs** were supported in Scotland in 2017/18, with an associated £16.7m in GVA.[23]

Visitor-related

3.22 The previous study found that the gross visitor economy contribution of the NFE amounted to 3,790 FTE jobs (direct, indirect and induced) and £109.6 million in GVA, of which 2,560 – 3,500 FTEs were additional.[24] This was based on a total visitor expenditure injection of £157.8m (2012/13 prices), for those visits where the NFE was the main destination.

3.23 Data provided to us shows that since then, the total number of annual visits has risen by 14%. Applying the method set out in Section 2 leads to the following economic impact results shown in table 3.5 below (the results from 2012/13 have been reproduced for comparison. This analysis implies that:

- The NFE had a total visitor economy **contribution** of 4,166 FTEs and £170 million in GVA, based on the number of visits received in 2016
- Taking account of additionality of visits from Scotland residents,[25] the total economic **impact** amounted to 3,220 FTEs and £128 million in GVA.

3.24 Overall, then, taking into account the increase in visits, inflation and changes in the Scottish economy (as reflected in multiplier effects), the visitor economic contribution of the NFE has risen by around 10% since 2012/13.[26]

[23] Based on Nation/Region GVA per Job Ratio of £63,200 from Renewables UK, Onshore Wind: Economic Impacts, 2015 updated to current values using a GDP Deflator from the statistics.gov.scot website

[24] The range reflects the uncertainty on the portion of Scotland-based visitors whose visit to FES (and associated spend) was additional – i.e. it could range from zero to 100%. All visits from the rest of the UK and overseas were treated as additional.

[25] This assumes 50% additionality of Scottish overnight visitors and 0% additionality for Scottish day visitors, as was assumed in the previous study.

[26] The increase in economic impact is lower than the increase in the number of visits because we have excluded from our calculation the impacts associated with admissions charges. As discussed with the Forestry Commission, this is in order to avoid double counting with the direct, indirect and induced impacts shown earlier (a portion of which will be supported by these admissions receipts). It is also possible that some of the direct jobs are also supported by visitor spend on retail on the sites, but it is not possible to know this from the data.

Table 3.7 Visitor Related Impacts, 2017/18 and 2012/13						
	2012/13 results			2017/18 results		
	Spend per job (2012/13 prices)	Jobs (FTEs)	GVA (£m, 2012 prices)	Spend per job (2017/18 prices)	Jobs (FTEs)	GVA (£m, 2017/18 prices)
Other UK and overseas	£34,560	2,560	71.6	£45,850	2,718	108
Scottish overnight	£34,630	943	26.6	£46,300	993	40
Scottish day trips	£59,500	284	11.3	£52,350	455	19
Total	**£37,630**	**3,790**	**109.6**	**£46,700**	**4,166**	**167**
Indicative additional	**-**	**3,030**	**85**	**-**	**3,220**	**128**

Source: Hatch Regeneris calculations

Note: Uses visits data for 2016.

Summary of results

3.25 Table 3.8 provides a summary of the results in terms of FTEs supported, and compares them to those for 2012/13. Bringing together all of the above analysis suggests that the National Forest Estate supported a total of **10,255 FTEs and £410m in GVA** for Scotland. Hence, the analysis suggests that the overall economic contribution has remained roughly unchanged since the 2012/13 figures, albeit with some shifts in the composition of this contribution between the different sources.[27]

3.26 The implication is that the economic contribution of the NFE in Scotland remains significant.

Table 3.8 FTEs supported by Scotland National Forest Estate, 2017/18 and 2012/13			
	2012/13	2017/18	Change
Direct	886	845	-41 (-5%)
Indirect	1,628	1,030	-330 (-20%)
Induced		265	
Timber harvesting, processing and haulage	3,994	4,050	+50 (+1%)
Deer management	35	40	+5 (14%)
Renewables			
- Wind	681	540	-141 (-21%)
- Hydro	n/a	265	n/a
Visitor economy spillovers (indicative additional)	3,030	3,220	**+190 (+6%)**
Total	**10,255**	**10,255**	**-**

Source: Hatch Regeneris calculations

[27] The figures are not directly comparable due to the addition of hydro power to the 2017/18 figures, which was not covered previously. Excluding this, there has been 2.6% drop in FTEs supported.

www.hatchregeneris.com
London: +44(0)207 336 6188 Manchester: +44(0)161 234 9910