Assumptions used for the baseline and change in exposure for the biodiversity impact assessments

Project	**The impacts of low carbon energy technologies on biodiversity** *(Project code WC1012)*
Client	Department for Environment, Food and Rural Affairs (defra), UK
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Contents

NUCLEAR POWER

Change in exposure	linked to construction and production in the UK, but not decommissioning or waste storage.
Proxy parameter selected for change in exposure:	Land footprint (hectares)
Parameter used in the DECC Calculator:	Installed capacity of nuclear power stations *(Sheet 'II.a' – Nuclear power)*
Assumptions:	New sites will be built with a land footprint of 60.5 ha/GW installed capacity or for a 3 GW nuclear power station 181 ha. It is assumed that the decommissioned sites will continue to exist for many years, so their footprint is not reduced.
Baseline (2007)	1000 ha
Level 1 (2050)	1000 ha (0%)
Level 2 (2050)	1000 ha+2080 ha (+208%)
Level 3 (2050)	1000 ha+4800 ha (+480%)
Level 4 (2050)	1000 ha+8000 ha (+800%)

According to the 2050 Pathways Analysis Report, there were 17 nuclear reactors operational in the UK with a combined installed capacity of over 10 GW.
The Calculator uses an illustrative station size of 3 GWpeak and therefore assumes that in 2007 there are only 4 nuclear power complexes.
The main impacts on biodiversity are due to the location of sites in coastal areas (e.g. disturbance from the use of cooling water). The location and the number of sites are therefore more related to the changes in exposure than installed capacity.
Using either the installed capacity or the number of nuclear sites as assumed in the Calculator would be misleading as a proxy for exposure. Instead of using the assumed number of illustrative nuclear power complexes for the baseline, we base on the actual land footprint of nuclear sites.

The land footprint of past and present nuclear sites is estimated to be around 1000 ha[1]. Present sites are estimated to have land footprint of around 300 ha. The land footprint of decommissioned nuclear sites (since 1989) is around 700 ha (including Oldbury which was shut down in 2012). Based on the UK Government's planning documents for new nuclear sites[2], the new sites will have a land footprint of around 60.5 ha/GW installed capacity. For a 3 GW nuclear station this corresponds to 160 ha.

[1] Table of past and present UK nuclear reactors https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210410/Table_of_UK_nuclear_reactors.pdf

[2] DECC (2009) Evaluation of BERR's engagement of the public and other interested parties in the future of civil nuclear power in the UK. https://www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/new-nuclear-power-stations

COAL

Change in exposure	UK coal production (i.e. mining)
Proxy parameter selected for change in exposure:	Amount of coal extracted/mined in the UK
Parameter used in the DECC Calculator:	Indigenous fossil-fuel production, coal and fossil waste (TWh) *(Sheet 'XV.b' - Indigenous fossil-fuel production)*
Assumptions:	The energy content of one tonne of coal is constant until 2050. The impacts from mining per tonne of coal is also constant until 2050. Excludes coal imports and mining activities outside of the UK. The UK imported 2.6 times the amount of domestically extracted coal in 2007.
Baseline (2007)	124.4 TWh
Level 1 (2050)	64.0 TWh (-49%)
Level 2 (2050)	13.9 TWh (-89%)
Level 3 (2050)	1.9 TWh (-98%)
Level 4 (2050)	1.9 TWh (-98%)

All values taken directly from the DECC Calculator

OIL & GAS

Change in exposure	UK oil and gas production (i.e. extraction / drilling)
Proxy parameter selected for change in exposure:	Amount of oil and gas extracted in the UK (onshore and offshore)
Parameter used in the DECC Calculator:	Indigenous fossil-fuel production, sum of 'Oil and petroleum products' and 'Natural gas' (TWh) *(Sheet 'XV.b' - Indigenous fossil-fuel production)*
Assumptions:	The change of exposure is the sum of oil and gas extraction in the UK. The energy content of one tonne of crude oil / natural gas is constant until 2050. The impacts from drilling per tonne of crude oil or natural gas is the same and is also constant until 2050. Excludes oil and gas imports and drilling activities outside of the UK. In 2007 about imports of oil corresponded to 70% of domestic production. Imports of natural gas corresponded to 40% of domestic extraction.
Baseline (2007)	731.0 TWh
Level 1 (2050)	189.9 TWh (-89%)
Level 2 (2050)	75.3 TWh (-96%)
Level 3 (2050)	20.3 TWh (-99%)
Level 4 (2050)	20.3 TWh (-99%)

From the DECC Calculator *(Sheet 'XV.b')*

Indigenous fossil-fuel production [TWh]	**2007**	**Level 1 2050**	**Level 2 2050**	**Level 3 2050**	**Level 4 2050**
Coal and fossil waste	124.40	64.0	13.9	1.9	1.9
Oil and petroleum products	975.89	107.7	44.0	11.9	11.9
Natural gas	731.00	82.2	31.2	8.4	8.4
Total oil and gas	**1706.9**	**189.9**	**75.3**	**20.3**	**20.3**

HYDROELECTRIC

Change in exposure	Construction and operation of reservoirs and in river schemes
Proxy parameter selected for change in exposure:	Number of sites / reservoir area / catchment area
Parameter used in the DECC Calculator:	Installed peak capacity (GW) *(Sheet 'III.b' – Hydroelectric power stations)*
Assumptions:	In the DECC Calculator, the number of sites, reservoir and catchment area is proportional with the installed peak capacity. Only the impacts on biodiversity of large-scale hydroelectric plants were assessed. The assessments do not include the impacts of small and micro scale hydro plants, even though these are the types of installations that will progressively increase until 2050.
Baseline (2007)	1.3 GW
Level 1 (2050)	1.6 GW (+24%)
Level 2 (2050)	2.1 GW (+62%)
Level 3 (2050)	2.5 GW (+93%)
Level 4 (2050)	4.0 GW (+209%)

There are three main categories used to define the output from hydroelectric power (https://www.gov.uk/harnessing-hydroelectric-power):

- large-scale capacity: hydro plant producing more than 5 megawatts (MW)
- small-scale capacity: hydro plant producing less than 5 megawatts
- micro-scale capacity: hydro plant producing less than 50 kilowatts

Each type of hydro plant has different impacts on biodiversity. Large-scale capacity plants typically rely on storage schemes, i.e. a dam impounds water in a reservoir that feeds the turbine and generator that are usually located within the dam itself. Micro-scale hydro plants are run-of-river schemes that do not require reservoirs or flooding.

In 2007 the majority (90%) of electricity from hydroelectric plants came from large-scale hydro, which was installed during the first renewable energy revolution in the 1940s and 50s, with the remaining 10% from hundreds of micro and small scale schemes. The DECC 2050 Pathways analysis report assumes that increases in hydroelectric production will come from major refurbishment and increments in capacity from small and micro hydro schemes. The highest levels for hydroelectric would require overcoming a number of environmental, technical and financial constraints.

Although we managed to obtain some data from the Environmental Agency and SEPA, on in-river hydro schemes (i.e. mostly micro- and small-scale hydro) we have come to the conclusion that we cannot assess these impacts. The main problems are that we do not know how many in-river schemes there are in Scotland at all, we know how many there are in England and Wales but do not know how many resulted in new impoundments (the main impact on rivers) as many use existing structures, the sensitivity of species to hydrological changes in surrounding habitats to in-river hydro is not well known. Therefore the assessments only quantitatively assess impacts of large-schemes that result in reservoir construction and flooding of upland valleys. Comments are placed in the sheets though that can be used for narrative messages in the Calculator.

ONSHORE WIND POWER

Change in exposure	All impacts from erection and operation of onshore wind turbines in UK
Proxy parameter selected for change in exposure:	Number of onshore wind turbines
Parameter used in the DECC Calculator:	Approximate number of 2.5 MW turbines *(Sheet 'III.a.1' – Onshore wind)*
Assumptions:	Onshore wind turbines in operation in 2007 had a much smaller capacity than 2.5 MW, more like 1.0 – 1.2 MW each. There were therefore more than 833 onshore wind turbines in operation in 2007. The average 2.5 MW assumption in the DECC Calculator is maintained. Although the exposure increase in this way is more significant, it takes into consideration that larger capacity wind turbines will also result in greater impacts than smaller capacity wind turbines. Full load hours per year: Low wind areas = 1600 hours Medium wind areas = 2100 hours Coastal areas = 2700 hours Assumptions on % time flying and flight heights were made for each bird species.
Baseline (2007)	833 onshore wind turbines, each 2.5 MW
Level 1 (2050)	0 onshore wind turbines, each 2.5 MW (-100%)
Level 2 (2050)	8000 onshore wind turbines, each 2.5 MW (+860%)
Level 3 (2050)	13000 onshore wind turbines, each 2.5 MW (+1460%)
Level 4 (2050)	20000 onshore wind turbines, each 2.5 MW (+2300%)

The assessments were based on the location of baseline wind farms (http://www.renewableuk.com/en/renewable-energy/wind-energy/uk-wind-energy-database/index.cfm). Bird collision risk was estimated using assumptions on species behaviour (e.g. flying time during the day / year and flight heights), wind turbine size, turbine radius, blade width, turbine rotation speed, hub height, pitch and operation time (based on SOSS Project 2: http://www.bto.org/science/wetland-and-marine/soss/projects).

OFFSHORE WIND POWER

Change in exposure	All impacts from erection and operation of offshore wind turbines in UK
Proxy parameter selected for change in exposure:	Number of offshore wind turbines
Parameter used in the DECC Calculator:	Approximate number of 5.8 MW turbines *(Sheet 'III.a.2' – Offshore wind)*
Assumptions:	Offshore wind turbines in operation in 2007 had a much smaller capacity than 5.8 MW, more like 2.5 MW each. There were therefore more than 68 offshore wind turbines in operation in 2007 (149 according to Renewable UK). The average 5.8 MW assumption in the DECC Calculator is maintained. Although the exposure increase in this way is more significant, it takes into consideration that larger capacity wind turbines will also result in greater impacts than smaller capacity wind turbines. Full load hours per year: Low wind areas = 1600 hours Medium wind areas = 2100 hours Coastal areas = 2700 hours Assumptions on % time flying and flight heights were made for each bird species.
Baseline (2007)	68 onshore wind turbines, each 5.8 MW
Level 1 (2050)	0 onshore wind turbines, each 5.8 MW (-100%)
Level 2 (2050)	10000 onshore wind turbines, each 5.8 MW (+14628%)
Level 3 (2050)	17000 onshore wind turbines, each 5.8 MW (+24938%)
Level 4 (2050)	40000 onshore wind turbines, each 5.8 MW (+58813%)

The assessments were based on the location of baseline wind farms (http://www.renewableuk.com/en/renewable-energy/wind-energy/uk-wind-energy-database/index.cfm). Bird collision risk was estimated using assumptions on species behaviour (e.g. flying time during the day / year and flight heights), wind turbine size, turbine radius, blade width, turbine rotation speed, hub height, pitch and operation time (based on SOSS Project 2: http://www.bto.org/science/wetland-and-marine/soss/projects).

The number and location of the offshore wind turbines can be found in the following table (source: http://www.renewableuk.com/en/renewable-energy/wind-energy/uk-wind-energy-database/index.cfm):

Wind project	**Region**	**Location**	**Turbines**	**Project capacity [MW]**	**Turbine capacity [MW]**	**Current status date**
Barrow	North West	7 km Walney Island	30	90	3	Jul-06
Beatrice Demonstration	Scotland	Beatrice Oilfield, Moray Firth	2	10	5	Ju-07
Blyth Offshore	North East	1 km Blyth Harbour	2	3,8	2	Dec-01
Burbo Bank	North West	5.2 km Crosby	25	60	3.6	Oct-07

Wind project	Region	Location	Turbines	Project capacity [MW]	Turbine capacity [MW]	Current status date
Kentish Flats	South East	8.5 km offshore from Whitstable	30	90	3	Oct-05
North Hoyle	North Wales	7.5 km Prestatyn & Rhyl	30	60	2	Dec-03
Scroby Sands	East of England	3 km NE Great Yarmouth	30	60	2	Mar-04
Total			*149*	*373.8*	*2.5*	

The locations are also available in a map view: http://www.renewableuk.com/en/renewable-energy/wind-energy/uk-wind-energy-database/index.cfm/map/1/status/Operational/project_type/offshore/

For the future locations of offshore wind turbines, the Renewables UK website provides the locations for the sites under construction and consented.

The Crown Estate has mapped out the areas where the Round 3 (future offshore wind turbines will be constructed):
http://www.renewableuk.com/en/utilities/document-summary.cfm?docid=63B303B4-425D-4CD3-B032A0A4F109E42C
http://www.renewableuk.com/en/utilities/document-summary.cfm?docid=534FCE8C-D4DB-490D-A58E6B14B4B72BE4

The Carbon Trust has gone beyond this and tried to evaluate the potential for sites in 2020 and beyond. They estimate 29 GW of offshore wind power is feasible by 2020 (currently there is about 8 GW, the UK Government proposes to build up to 16 GW in 2020 and up to 39 GW in 2030). The Carbon Trust shows there is a trade-off between costs and planning constraints. On page 19-21 of this report, they show which areas have the greatest potential (i.e. lowest development costs). They also provide approximate densities:
http://www.carbontrust.com/media/42162/ctc743-offshore-wind-power.pdf

Finally, DECC provides their Strategic Environmental Assessment of Offshore energy and environmental impacts:
https://www.gov.uk/government/publications/uk-offshore-energy-strategic-environmental-assessment-2-environmental-report
In particular the report on page 329-342 provides an idea of where future off shore wind turbines may be placed:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/195390/OESEA2_ER_with_NTS_Part2.pdf

TIDAL RANGE

Change in exposure	All impacts from erection and operation of tidal range schemes in UK
Proxy parameter selected for change in exposure:	Installed capacity of tidal range schemes
Parameter used in the DECC Calculator:	Installed capacity of tidal range schemes *(Sheet 'III.c' – Tidal and Wave)*
Assumptions:	As no tidal range schemes exist in the UK, the baseline is based on the three tidal range schemes where feasibility studies have been carried out. This corresponds to the Level 2 in 2050 in the DECC Calculator (Level 1 is no tidal range streams). This is done as it is not possible to calculate a percentage change in exposure if the baseline was zero. The three schemes to be installed first are assumed to be Severn (Shoots Barrage assumed), Mersey (option VLHBv3a assumed) & Solway (option B3 assumed). Although the trajectories described in the DECC Calculator is based on the actual potential of tidal range resources in the UK, the Calculator calculates the number of tidal range schemes corresponding to 240 MW per tidal range scheme. The proposed potential tidal range schemes in the UK all have an installed capacity much greater (620 MW – 8640 MW). For example, the three schemes proposed for Level 2 will have an estimated total capacity of 1.7 GW. To take into consideration the different sizes of tidal range schemes, the installed capacity is thought to be a better proxy for change of exposure than number of tidal range schemes.
Baseline (2007)	0 tidal range schemes
Level 1 (2050)	0 tidal range schemes
Level 2 (2050)	3 tidal range schemes, 1.7 GW in total (100%)
Level 3 (2050)	4 tidal range schemes, 13 GW in total (+654%)
Level 4 (2050)	8 tidal range schemes, 20 GW in total (+1059%)

From the DECC Calculator *(Sheet 'III.c' – Tidal and Wave)*

Tidal range, installed capacity [GW]	**2007**	**Level 1 2050**	**Level 2 2050**	**Level 3 2050**	**Level 4 2050**
Tidal range	0	0	1.73	13.00	20.00

TIDAL STREAMS

Change in exposure	All impacts from erection and operation of tidal stream turbines in UK
Proxy parameter selected for change in exposure:	Number of tidal stream turbines
Parameter used in the DECC Calculator:	Number of tidal stream turbines (based on trajectory descriptions) *(Sheet 'III.c' – Tidal and Wave)*
Assumptions:	In 2007 SeaGen (located in Strangford Lough, Northern Ireland) became the world's first commercial tidal stream power station. The change of exposure in relation to a baseline of just one turbine is of course questionable, but this it remains the best reference for actual impacts on biodiversity. Other tidal stream turbines are still being tested and/or not constructed to full scale. SeaGen has a capacity of 1.2 MW[3], but the average tidal stream turbine in the DECC Calculator is assumed to be larger: 2.0 MW (a bit larger than a Seagen device). The number of tidal stream turbines is thought to be the most representative indicator of change of exposure - than installed capacity or tidal impoundment area.
Baseline (2007)	1 tidal stream turbine, 2 MW in total
Level 1 (2050)	0 tidal stream turbines (-100%)
Level 2 (2050)	951 tidal stream turbines, 1.9 GW in total (+95029%)
Level 3 (2050)	4756 tidal stream turbines, 9.5 GW in total (+475547%)
Level 4 (2050)	10781 tidal stream turbines, 21.6 GW in total (+1078033%)

From the DECC Calculator *(Sheet 'III.c' – Tidal and Wave)*

Tidal stream, installed capacity [GW]	**2007**	**Level 1 2050**	**Level 2 2050**	**Level 3 2050**	**Level 4 2050**
Tidal stream	0	0	1.90	9.51	21.56

[3] http://www.seageneration.co.uk/

BIOFUELS (FIRST GENERATION ENERGY CROPS)

Oilseed rape, sugar beet and wheat

Change in exposure	Impacts of UK feedstock production on arable agricultural land
Proxy parameter selected for change in exposure:	UK crop areas (oilseed rape, sugar beet and wheat) used for biofuels
Parameter used in the DECC Calculator:	Area of arable land for 1st gen energy crops (grades 1–3) *(Sheet 'VI.a' – Agriculture and land use)*
Assumptions:	The year 2007 was an exceptional year for non-food rape seed production in the UK. The production doubled compared to 2006 and fell with 85% the year after in 2008. The DECC Calculator recognises this as for the year 2007 'Arable land use for 1st gen energy crops (grades 1–3)' is estimated to be 3479 km^2, but the Level 1 trajectory description for 2050 is 'Energy crops and food production similar to today' and is estimated at 700 km^2. This is also more in line with Defra's Experimental Statistics (see the land use in the years 2008-2010 in the table below). For the assessment, the land use in 2008 (219 km^2) was used instead as it is more representative of the baseline impact.
Baseline (2007)	219 km^2 (the baseline year for 2008 was used)
Level 1 (2050)	700 km^2 (+220%)
Level 2 (2050)	1000 km^2 (+357%)
Level 3 (2050)	1000 km^2 (+357%)
Level 4 (2050)	1000 km^2 (+357%)

From the DECC Calculator *(Sheet 'VI.a' – Agriculture and land use)*

Agriculture [km^2]	**2007**	**Level 1 - 2050** A. "Food production"	**Level 2 - 2050** B. "Carrying on"	**Level 3 - 2050** C. "Breakthrough"	**Level 4- 2050** D. "Biomass"
Arable, for 1st gen energy crops (grades 1–3)	3 479	700	1 000	1 000	1 000

Non-food crop land use statistics from Defra

Land use (km^2)	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total, oilseed rape, sugar beet and wheat used for biofuels (Defra 2009)	660	1152	1508	3200	522	924	
Total, oilseed rape, sugar beet and wheat used for biofuels (Defra 2013)					219	270	967

Sources:

- *Defra (2009) Experimental Statistics. Non-Food Crop Areas United Kingdom.* http://archive.defra.gov.uk/evidence/statistics/foodfarm/landuselivestock/nonfoodcrops/documents/nonfoodcrops.pdf
- *Defra (2013) Experimental Statistics. Area of Crops Grown For Bioenergy in England and the UK: 2008-2011* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/141626/defra-stats-foodfarm-landuselivestock-nonfoodcrops-latestrelease-130125.pdf

BIOMASS FROM DEDICATED ENERGY CROPS (SECOND GENERATION ENERGY CROPS)

Short rotation coppice (SRC) and Miscanthus

Change in exposure	Impacts of UK feedstock production on arable agricultural land and grassland
Proxy parameter selected for change in exposure:	UK crop areas used for dedicated bioenergy crops (short rotation coppice (SRC) and Miscanthus)
Parameter used in the DECC Calculator:	Sum of area of arable land for 2nd gen energy crops (grades 1–3) and area of grassland for 2nd gen energy crops (grades 3–4). *(Sheet 'VI.a' – Agriculture and land use)*
Assumptions:	The impacts of growing SRC and Miscanthus depend on whether arable agricultural land is used or grassland is transformed. This distinction is not made here. The calculations use the sum of arable agricultural land and grassland as a proxy for the change of exposure of crop area of SRC and Miscanthus.
Baseline (2007)	160 km^2
Level 1 (2050)	2820 km^2 (+1663%)
Level 2 (2050)	10726 km^2 (+6604%)
Level 3 (2050)	22850 km^2 (+14181%)
Level 4 (2050)	40680 km^2 (+25325%)

From the DECC Calculator *(Sheet 'VI.a' – Agriculture and land use)*:

Agriculture [km^2]	**2007**	**Level 1 - 2050** A. "Food production"	**Level 2 - 2050** B. "Carrying on"	**Level 3 - 2050** C. "Breakthrough"	**Level 4- 2050** D. "Biomass"
Arable, for 1st gen energy crops (grades 1–3)	3 479	700	1 000	1 000	1 000
Arable, for 2nd gen energy crops (grades 1–3)	160	300	4 526	13 550	13 550
Grassland, for 2nd gen energy crops (grades 3–4)	0	2 520	6 200	9 300	27 130
Total 2nd gen energy crops	**160**	**2 820**	**10 726**	**22 850**	**40 680**

Non-food crop land use statistics from Defra

Land use (km^2)	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total, SRC and Miscanthus (Defra 2009)	23	37	95	154	180	192	
Total, SRC and Miscanthus (Defra 2013)					137	129	112

Sources:

- *Defra (2009) Experimental Statistics. Non-Food Crop Areas United Kingdom. http://archive.defra.gov.uk/evidence/statistics/foodfarm/landuselivestock/nonfoodcrops/documents/nonfoodcrops.pdf*
- *Defra (2013) Experimental Statistics. Area of Crops Grown For Bioenergy in England and the UK: 2008-2011*

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/141626/defra-stats-foodfarm-landuselivestock-nonfoodcrops-latestrelease-130125.pdf

BIOMASS FROM AGRICULTURAL AND FORESTRY RESIDUES

Change in exposure	Impacts of use of residues produced in the UK
Proxy parameter selected for change in exposure:	Amount of straw (food/energy crops) and wood waste removed from arable land and forests
Parameter used in the DECC Calculator:	Dry biomass and waste (straw, wood from old forest and wood from new forest) *(Sheet 'VI.a' – Agriculture and land use)*
Assumptions:	The different trajectory levels are based on different fractions of collected straw and wood. The energy content (TWh per oven dried tonne (odt)) of each of the respective residues is considered to be constant over time. The impacts of removing residues depend on whether it is straw or wood (and also type of forest, e.g. old or new). In the calculations this distinction is not made. The total dry biomass and waste, which sums the amount of straw, wood from old forest and wood from new forest residues, is used as a proxy for change of exposure.
Baseline (2007)	2.5 TWh
Level 1 (2050)	4.3 TWh (+71%)
Level 2 (2050)	21.5 TWh (+756%)
Level 3 (2050)	81.8 TWh (+3161%)
Level 4 (2050)	86.8 TWh (+3359%)

From the DECC Calculator *(Sheet 'VI.a')*:

Straw collection				% collected
Trajectory	**Description**	**2007**	**2010**	**2050**
1	"Food production"	3%	5%	5%
2	"Carrying on"	3%	3%	24%
3	"Breakthrough"	3%	5%	100%
4	"Biomass"	3%	5%	100%

Forestry arisings collection, old forests				% collected
Trajectory	**Description**	**2007**	**2010**	**2050**
1	"Food production"	3%	5%	5%
2	"Carrying on"	3%	3%	24%
3	"Breakthrough"	3%	5%	80%
4	"Biomass"	3%	5%	80%

Total forestry arisings, new forests				M odt
Trajectory	**Description**	**2007**	**2010**	**2050**

1	"Food production"	-	-	-
2	"Carrying on"	-	-	0.37
3	"Breakthrough"	-	-	3.57
4	"Biomass"	-	-	4.53

Amount of energy from agricultural and forestry residues	**2007**	**Level 1 2050**	**Level 2 2050**	**Level 3 2050**	**Level 4 2050**
Energy (straw)	1.9	3.2	14.4	46.4	46.4
Energy (wood waste), old forest	0.6	1.1	5.2	17.0	17.0
Energy (wood waste), new forest	0.0	0.0	1.9	18.4	23.4
Dry biomass and waste	**2.5**	**4.3**	**21.5**	**81.8**	**86.8**