

DANISH ENERGY AGENCY

Memorandum

5 April 2011

Ref.: 2104/1164-0004

BJK, LBJ, FBE

Clarification of the Danish Renewable Energy Action Plan drawn up under Commission Decision C(2009) 5174 of 30 June 2009

On 11 February 2011 the Danish Permanent Representation received a letter with enclosures from the European Union requesting its comments on a series of questions and requests for clarification of the Danish NREAP, which was sent to the Commission in June 2010.

The Commission requested a reply to the questions no later than two months after receipt of the request.

This memorandum is our reply to the Commission's request.

General comments

First, we would like to point out that since the NREAP was sent last summer we have drawn up and published the report 'Energy Strategy 2050' of February 2011. This is the Government's proposal for realising the vision of becoming independent of coal, oil and natural gas. The proposed action in the report is expected to bring the proportion of renewable energy to 33% by 2020, 3 percentage points more than Denmark's EU commitment to achieve 30% renewable energy by 2020.

Our Government is currently negotiating the strategy's initiatives with the Parliament's parties and once the negotiations are concluded there may be a need to adjust the Action Plan's targets for RE expansion.

This memorandum does not include new initiatives resulting from Energy Strategy 2050; it merely answers the Commission's request for clarification of sections and tables in the June 2010 Action Plan. The Plan's assessments of RE expansion forecasts have not, therefore, been changed in this memo, but the conditions providing the basis for the RE trajectory indicated in the Plan have been clarified and the explanations expanded. Last, specific changes and additions have been made to the data in Tables 3, 7, 7a and 12, whereas the underlying conditions and calculations are unchanged.

This memo reproduces the Commission's questions, followed by the answers. If the answer has resulted in changes to the actual text of the Plan both the original and the revised wordings are provided. Where the answer has resulted in changes in the tables, the amended tables are provided as attachments to this memo.

Table 3

Question/request:

Figures for minimum trajectories (% as well as ktoe) do not match the Commission's calculation. This calculation should be checked (using 17% as S_{2005} , as set out in the

Directive). In particular the indicated domestic trajectory which has to be above the minimum trajectory and the figures for “Surplus for cooperation mechanism” should be checked.

Reply:

The figures in the row “Total RES” in Table 3 of the Plan were given as the RE figures for the minimum trajectory up to 2020. To obtain the domestic RE trajectory figures the figures in the row “Surplus for cooperation mechanism” should be added.

The row “Total RES” has been corrected and now shows the domestic RE trajectory up to 2020. The table has also been corrected on the basis that $S_{2005} = 17\%$. There are no other changes to Table 3.

Changes to the Action Plan:

Corrected Table 3 attached.

Biofuel support schemes (4.5)

Question/request:

The concrete obligations/targets per year (per fuel or technology) should be provided. They should refer to the period until 2020, as the reference period for the action plan [4.5 (a)].

Reply:

Please refer to Table 12 for the possible phasing-in of biofuels in the individual years up to 2020. Second-generation biofuels are phased in in the Table linearly from 2015 onward, to reach a proportion of 50% by 2020. No specific blending requirements have been set for second-generation biofuels so the phasing-in is based on an anticipated need to use such fuels to meet the blending requirement and at the same time comply with the CEN standards on how much biofuel can be added to gasoline and diesel. (Referring to the fact that second-generation biofuels count double.) The distribution is skewed – more biodiesel is blended into diesel than bioethanol is blended into gasoline. This takes account of both the forecast prices for biofuels and the technical limitations which apply in particular to the blending of bioethanol into gasoline.

Question/request:

The level of ambition for second-generation biofuels should be consistent with the support measures envisaged. Therefore additional information on the support measures for second-generation biofuels [4.5 (b)] should be provided.

Reply:

Please refer to the reply to the question above. It may be necessary to use second-generation biofuels to comply with the CEN standards. The phasing-in of such fuels is also conceivable via the setting of specific criteria for their use. When the Action Plan was drawn up we did not know whether that was possible. In December last year the Commission acknowledged that it was in principle possible. We have not yet decided whether to implement this. Another option is to support the production of second-generation bioethanol. However, we do not know whether that bioethanol will

necessarily find application in Denmark. We will also update the extent to which this may be domestic production.

If it is decided not to implement further measures to promote the use of second-generation biofuel, it will be possible to meet the target by using a higher proportion of first-generation biofuel. This is conditional upon the CEN standards being adjusted so that higher percentages of blending are possible. In future progress reports to be sent to the Commission, the first at the end of 2011, Danish policy on the phasing-in of second-generation biofuels will be updated.

Special measures to support the use of energy from biomass (4.6)

Biomass supply (4.6.1):

Question/request:

For Tables 7 and 7a the figures should also be reported in units of m³ or alternatively in tonnes for forestry and agriculture.

Reply:

An additional Table 7 and Table 7a are attached with the requested additional information. Calorific values are used which are explained on page 91 of the Action Plan.

Table 7a has also been corrected, see below.

Question/request:

Table 7a: Data provided in this table should only include domestic biomass supply.

Reply:

We attach Table 7a as adjusted to include only domestic biomass supply.

Question/request:

The answer to the imports question should be addressed separately: It should be indicated what is the estimated role of imported biomass up to 2020, while specifying the expected quantities (ktoe) and indicating possible import countries.

Reply:

The main figures on forecast imports and exports up to 2020 are given in the expanded text. The countries from which wood pellets were imported in 2006 are also indicated, along with the percentages. Lastly, the import pattern up to 2020 is assessed.

Original text:

Page 94, first paragraph:

The growth in wood of about 32 PJ is largely expected to be covered by imported wood pellets which will be used in central co-generation plants. The import share of wood pellets is about 90%. Two of the 32 PJ are estimated to be produced in Denmark via increased wood chip generation.

Amended text:

An increase in wood consumption amounting to some 32 PJ/year (764 ktoe/year) is anticipated in 2020 compared to the reference year of 2006, in other words wood consumption is expected to increase from some 45 PJ in 2006 to about 77 PJ in 2020, an increase of some 70%. This growth is expected to be largely covered by imported wood pellets which will be used in central co-generation plants. The import share of wood pellets is currently about 90%.

In 2006 imports of wood pellets showed the following percentage breakdown:

Country	EU, %	Other countries, %
Estonia, Latvia, Lithuania	50	
Poland	14	
Germany	9	
Canada		6
Finland	5	
Sweden	4	
Russia		3
England	3	
Norway		2
Romania	2	
Belarus		2
Total	87	13

In other words, by far the largest proportion of wood pellets was imported from other EU countries in 2006.

The demand for wood pellets is expected to increase steeply throughout the world up to 2020. Global demand for wood pellets is expected to increase dramatically from some 8-9 million tonnes to around 150 million tonnes in 2020 (source: New Energy – magazine for renewable energy. No 2, April 2009). Production capacity is currently estimated at 12 million tpa, the majority of which is spread throughout Europe.

As a result, Danish imports of wood pellets from other EU countries are expected to still be high in 2020; at the same time, the rising global demand will result in increased production in countries outside the EU, so imports from those countries are also expected to increase.

2 PJ/year (48 ktoe/year) of the anticipated growth of 32 PJ/year in 2020 is expected to be met by increased domestic wood chip production. No exports of wood pellets are anticipated.

Question/request:

The plan gives its own breakdown of categories for Table 7 (from the Danish Energy Agency's statistics); however, the sum provided for Forestry, i.e. A1 + A2 (6780 + 19017 + 2343 + 6952 = 35092 TJ – found in the text below Table 7), is much lower than the one provided in table 7 (44982 + 7192 = 52174 TJ). This should be clarified.

Reply:

What is referred to in the text is production – not consumption – of wood for energy purposes. Total wood production A1 and A2 amounts to 35092 TJ (27900 + 7192 TJ).

Original text:

Page 90, first three paragraphs:

The amounts of biomass supplies in Table 7 are included in the Danish Energy Agency Statistics for 2008, for which the 2006 figures are shown in the table on page 5.

The Energy Agency Statistics are not presented in quite the same way as Table 7 and for this reason, the subcategories are not filled out. The following groupings relate to Table 7:

A1+A2: Wood chips (6780 TJ), firewood (19017 TJ), wood pellets (2343 TJ) and wood residue (6952) are roughly divided in category A1+A2.

Amended text:

The amounts of biomass supplies in Table 7 are included in the Danish Energy Agency Statistics for 2008; the 2006 figures are shown in the table on page 5.

The Energy Agency Statistics are not presented in quite the same way as Table 7 and partly for this reason, the subcategories are not filled out. The following re-groupings relate to Table 7:

A1+A2 (production of wood for energy purposes): Wood chips (6780 TJ) + firewood (19017 TJ) + wood pellets (2343 TJ) + wood residue (6952 TJ) = 35092 TJ are roughly divided into categories A1 (27900 TJ) + A2 (7192 TJ) = 35092 TJ. Wood imports are not divided into subcategories.

Question/request:

The following question should be answered: On what basis was the biodegradable fraction of municipal solid waste and of industrial waste calculated?

Reply:

Page 91, second paragraph:

Original text:

In energy and CO₂ emission statistics, waste is divided into two components: biodegradable waste and non-biodegradable waste. In accordance with international conventions, including the definitions in Article 2 of the RE Directive, the biodegradable part is regarded as renewable energy. In Danish energy statistics it was assumed that up to and including 2007, 77.7% of waste would be biodegradable. Following research work undertaken by the National Energy Research Institute (NERI), a part of the Ministry of the Environment, the statistics for 2008 presuppose a lower share of 58.8%. This has now been back-calculated in all figures and consequently also in Table 7. The 58.8% share is

furthermore carried into calculations of the share of renewable energy in the action plan up to 2020.

Amended text:

In energy and CO₂ emission statistics, waste is divided into two components: biodegradable waste and non-biodegradable waste. In accordance with international conventions, including the definitions in Article 2 of the RE Directive, the biodegradable part is regarded as renewable energy. In Danish energy statistics it was assumed that up to and including 2007, 77.7% of waste would be biodegradable. Following research work undertaken by the National Environment Research Institute (NERI), a part of the Ministry of the Environment, the statistics for 2008 presuppose a lower share of 58.8%.

This assessment was performed on the basis of a report from a working party comprising representatives of the National Environment Research Institute, Danmarks Tekniske Universitet (DTU), Vestforbrænding, DONG Energy, Force Technology and the Energy Agency. It was based on a large number of other projects at DTU Environment in which data on the composition of Danish waste were collated and evaluated. Data covered the relative distribution of 48 material fractions in household waste and the chemical composition of those fractions, including data on total carbon content. For each material fraction a visual assessment was made of the distribution between fossil and biogenic carbon. Based on these data plus data for industrial waste, analysed in connection with DONG's combustion trial (co-combustion) at Esbjerg in December 2008 a further three material fractions were defined.

The analysis result was that the CO₂ emission was between 25 and 40 kg CO₂ per GJ, with a mean of 32.5 kg CO₂ per GJ. Even though the analysis included large amounts of data the result was still within a broad range which was, however, clearly above the assessment hitherto used, 17.6 kg CO₂ per tonne waste. The previous emission factor had been in use since 1996 and was based on the composition of Danish household waste from the early 1990s.

Biomass mobilisation (4.6.2):

Question/request:

The status of energy crops in Denmark should be clarified. It is said that the Green Growth plan includes the expansion of agriculture's role as supplier of green energy such as energy crops and biogas. However, figures for supply of perennial energy crops are put under Forestry and no figures are provided under Agriculture direct supply (B.1, 1c and B.1, 1d of table 7).

Reply:

The comments on the categorisations of the figures in Table 7 clarify where the figures for energy crops are. The energy content of short-rotation trees and grasses used for energy purposes is also estimated on the basis of the estimated land use for energy crops in Table 8.

New text after the third paragraph on page 90:

B1: There is no overall account for B1 (agricultural crops and fisheries products directly provided for energy generation). The figures for perennial energy crops (B.1 short-rotation trees) are included in A1 (forestry), and the figures for other energy crops such

as grasses (B.1 c) are included in B2 (agricultural by-products/processed residues and fisheries by-products for energy generation).

Table 8 estimates that 1000 ha were used for short-rotation trees for energy purposes, equivalent to some 10 000 tonnes of dry matter/year or 200 TJ/year (10 tonnes dry matter/year, calorific value some 20 GJ/tonne dry matter), and that a maximum of 50 ha was used for energy crops in the form of grass, equivalent to some 500 tonnes dry matter/year or 10 TJ/year.

Question/request:

The plan states that it would be possible to plant perennial energy crops without pesticides or manure alongside watercourses and lakes. It should be clarified whether the land used for these crops belongs to agricultural use or what is the legal status of this land.

Reply:

The perennial energy crops support scheme is targeted at the cultivation of agricultural land (EB eligible). The planting and cultivation of perennial energy crops without pesticides or manure alongside watercourses and lakes can only occur (see Bill L 158) if on the supported land outside the edge zones energy crops are cultivated along a strip which is at least as broad as the edge zone.

Table 11:

Question/request:

No increases are foreseen for geothermal heat, even though the plan describes considerable interest in this area for district heating, and that the first district heating plant from geothermal starts operation in 2010. Further details should be given on how geothermal heating has been considered in technology projections until 2020.

Reply:

Table 11 includes geothermal energy in two places: in the top line as 'Geothermal (excluding low temperature geothermal heat in heat pump applications)' and in the line 'RE from heat pumps, of which geothermal'.

Geothermal heat in Denmark is used for district heat production. Current and planned geothermal plants either use or intend to use heat at such a low temperature that it cannot be directly used for district heating. This is why the figure 0 is indicated for all years in the line 'Geothermal (excluding low temperature geothermal heat in heat pump applications)' while an increasing heat production from 5 PJ/year in 2010 to 8 PJ/year in 2020 is shown in the line 'RE from heat pumps, of which geothermal'.

Geothermal plants have been established in Thisted and Copenhagen and a new plant is expected to come on stream in Sønderborg in 2012. The Energy Agency has carried out a tendering procedure for land for the exploration and extraction of geothermal heat in Denmark. A number of applications have been received and are currently being examined by the Agency.

It should be noted that geothermal energy plants generally involve a long preliminary research stage often requiring several test boreholes before the plant can be designed and

built. This means that it will be some time before increasing interest in the exploitation of geothermal heat results in increasing heat production from geothermal energy plants.

Table 12:

Question/request:

The figures provided for bioethanol/bio-ETBE and biodiesel in 2020 indicate that all biofuels in these categories will be 2nd-generation biofuels and will be provided by imports. This should be clarified.

Reply:

There was a data-entry error in Table 12. The criterion for the calculations in the NREAP is that in 2020 50% will be second-generation biofuels (both bioethanol/bio-ETBE and biodiesel) and that second-generation biofuels will be phased in from 2015; see the reply to the questions on 'Biofuel support schemes, section 4.5'. Table 12 has now been corrected accordingly. No other changes have been made in Table 12.

Amendments to the NREAP:

Corrected Table 12 attached.

Question/request:

The share of renewable energy in transport, calculated on the basis of the data provided in Table 12, is 13.13%. This is not consistent with the value provided in Table 4b, 10.1%. This should be clarified.

Reply:

Please refer to the above reply. 50%, not 100%, second-generation biofuel will be used in 2020. Table 12 has therefore been corrected.

Table 3: National 2020 target and the estimated trajectory of energy share from renewable energy sources in heating, cooling, electricity and transport (*Calculation tables 4a and 4b are expected to be used in preparation of Table 3.*)

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Renewable energy sources for heating and cooling (%)	23.2	30.8	31.8	32.1	35.2	35.3	36.0	36.7	37.2	37.7	39.3	39.8
Renewable energy sources for electricity (%)	26.8	34.3	37.1	38.0	46.2	45.5	45.7	47.2	48.6	49.7	51.8	51.9
Renewable energy sources for transport (%)	0.2	1.0	3.5	5.9	6.0	6.0	6.7	7.3	7.9	8.6	9.4	10.1
Overall share of renewable energy sources (%)	17.0	21.9	23.4	24.2	27.3	27.2	27.6	28.2	28.6	29.1	30.1	30.4
<i>Of which from cooperation mechanism (%)</i>	-	-	0	0	0	0	0	0	0	0	-	0
<i>Surplus for cooperation mechanism (%)</i>	-	-	3.8	4.6	6.4	6.3	4.7	5.3	3.2	3.6	-	0.4
As Part B of Annex I of the Directive				2011-2012	2013-2014	2015-2016	2017-2018					2020
				S ₂₀₀₅ + 20 % (S ₂₀₂₀ -S ₂₀₀₅)	S ₂₀₀₅ + 30 % (S ₂₀₂₀ -S ₂₀₀₅)	S ₂₀₀₅ + 45 % (S ₂₀₂₀ -S ₂₀₀₅)	S ₂₀₀₅ + 65 % (S ₂₀₂₀ -S ₂₀₀₅)					S ₂₀₂₀
Minimum trajectory for renewable energy sources (%)				19.6	20.9	22.9	25.5					30.0
Minimum trajectory for renewable energy sources (ktoe)				3 235	3 472	3 787	4 195					4 926
Minimum trajectory for renewable energy sources (PJ)				135	145	159	176					206

Table 7: Biomass supply in 2006
(A+B+C1: 1000 tonnes/year; C3: million m³/year)

Sector of origin		Production	Imported		Exported	Net amount	Consumption
			EU	Third countries	EU/third countries		
A) Biomass From forestry:	<i>Of which</i>						
	1. Direct supply of wood biomass from forests and other wooded land for energy generation (note 1, 1000 t/year)	3000	1694				4837
	<i>Optional — if information is available you can further detail the amount of feedstock belonging to this category</i> a) fellings b) residues from fellings (tops, branches, bark, stumps) c) landscape management residues (woody biomass from parks, gardens, tree rows, bushes) d) other (please define)						
	2. Indirect supply of wood biomass for energy generation (note 2, (note 1, 1000 t/year))	489					489
	<i>Optional — if information is available you can further detail:</i> a) residues from sawmilling, woodworking, furniture industry (bark, sawdust) b) by products of the pulp and paper industry (black liquor, tall oil) c) processed wood-fuel d) post-consumer recycled wood (recycled wood for energy generation, household waste wood) e) other (please define)						
B) Biomass	<i>Of which:</i>						
From agriculture and fisheries: (1000 t/year)	1. Agricultural crops and fisheries products directly provided for energy generation	Unknown					Unknown
	<i>Optional — if information is available you can further detail:</i> a) arable crops (cereals, oilseeds, sugar beet, silage maize) b) plantations c) short rotation trees d) other energy crops (grasses) e) algae f) other (please define)						
	2. Agricultural by-products/processed residues and fisheries by-products for energy generation (note 3, 1000 t/year)	1488					1488

	<i>Optional — if information is available you can further detail:</i> <ul style="list-style-type: none"> a) straw b) manure c) animal fat d) meat and bonemeal e) cake by-products (incl. oil seed and olive oil cake for energy) f) fruit biomass (including shell, kernel) g) fisheries by-products h) clippings from vines, olives, fruit trees i) other (please define) 						
C) Biomass from waste:	<i>Of which:</i>						
	1. Biodegradable fraction of municipal solid waste including biowaste (note 4, 1000 t/year) (biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants) and landfill gas	2152					2152
	2. Biodegradable fraction of industrial waste (including paper, cardboard, pallets)						0
	3. Sewage sludge (note 5, million m³/year)	38					38

Source: The Danish Energy Agency's energy statistics

Notes to Table 7:

1. Estimated average calorific value, equivalent to wood chip
2. Estimated average calorific value, equivalent to wood waste
3. Estimated average calorific value, equivalent to straw
4. Estimated average calorific value, equivalent to waste
5. Estimated average calorific value, equivalent to biogas

Table 7a: Estimated biomass domestic supply in 2015 and 2020 (ktoe/year)

Sector of origin		2015		2020	
		Expected domestic production	Expected domestic supply	Expected domestic production	Expected domestic supply
A) Biomass from forestry	1. Direct supply of wood biomass from forests and other wooded land for energy generation	750	750	834	834
	2. Indirect supply of wood biomass for energy generation	172	172	172	172
B) Biomass from agriculture and fisheries	1. Agricultural crops and fishery products directly provided for energy generation				
	2. Agricultural by-products/processed residues and fishery by-products for energy generation	621	621	705	705
C) Biomass from waste	1. Biodegradable fraction of municipal solid waste including biowaste (biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants) and landfill gas	611	611	683	683
	2. Biodegradable fraction of industrial waste (including paper, cardboard, pallets)		0		0
	3. Sewage sludge	21	21	21	21

Table 7a: Estimated biomass supply in 2015 and 2020 (TJ/year)

Sector of origin		2015		2020	
		Expected domestic production	Expected domestic supply	Expected domestic production	Expected domestic supply
A) Biomass from forestry:	1. Direct supply of wood biomass from forests and other wooded land for energy generation	27.900	27.900	27.900	27.900
		Wood chips: +1000	Wood chips: +1000	+2000	+2000
		Multiannual energy crops: +2500	Multiannual energy crops: +2500	Multiannual energy crops: +5000	Multiannual energy crops: +5000
		Total: 31400	Total: 31400	Total: 34900	Total: 34900
	2. Indirect supply of wood biomass for energy generation	7192	7192	7192	7192
B) Biomass from agriculture and fisheries	1. Agricultural crops and fisheries products directly provided for energy generation				
	2. Agricultural by-products/processed residues and fisheries by-products for energy generation	22.457	22.457	22.457	22.457
		Straw: +500 Manure: +3000 Total: 26000	Straw: +500 Manure: +3000 Total: 26000	Straw: +1000 Manure: +6000 Total: 29500	Straw: +1000 Manure: +6000 Total: 29500
C) Biomass from waste:	1. Biodegradable fraction of municipal solid waste including biowaste (biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants) and landfill gas	22.594	22.594	22.594	22.594
		Waste: +3000 Total: 25600	Waste: +3000 Total: 25600	Waste: +6000 Total: 28600	Waste: +6000 Total: 28600
	2. Biodegradable fraction of industrial waste (including paper, cardboard, pallets)		0		0
	3. Sewage sludge	879	879	879	879

Table 7a: Estimated biomass domestic supply in 2015 and 2020 (ktoe/year)
(A+B+C1: 1000 tonnes/year; C3: million m³/year)

Sector of origin		2015		2020	
		Expected domestic production	Expected domestic supply	Expected domestic production	Expected domestic supply
A) Biomass from forestry	1. Direct supply of wood biomass from forests and other wooded land for energy generation	3376	3376	3753	3753
	2. Indirect supply of wood biomass for energy generation	4889	4889	4889	4889
B) Biomass from agriculture and fisheries	1. Agricultural crops and fishery products directly provided for energy generation				
	2. Agricultural by-products/processed residues and fishery by-products for energy generation	1549	1549	1549	1549
C) Biomass from waste	1. Biodegradable fraction of municipal solid waste including biowaste (biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants) and landfill gas	2152	2152	2152	2152
	2. Biodegradable fraction of industrial waste (including paper, cardboard, pallets)				
	3. Sewage sludge	38	38	38	38

Table 12: Estimation of total contribution expected from each renewable energy technology in Denmark to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in the transport sector 2010-2020
(ktoe)¹

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bioethanol/bio-ETBE	0	13	57	98	96	95	95	95	95	95	95	94
<i>Of which biofuels², cf. Article 21(2)</i>	0	0	0	0	0	0	8	16	24	32	40	47
<i>Of which imported³</i>	0	13	57	98	96	95	95	95	95	95	95	94
Biodiesel	0	18	83	147	148	149	152	155	158	161	164	167
<i>Of which biofuels⁴, cf. Article 21(2)</i>	0	0	0	0	0	0	13	26	40	54	68	84
<i>Of which imported⁵</i>	0	18	83	147	148	149	152	155	158	161	164	167
Hydrogen from renewables	0	0	0	0	0	0	0	0	0	0	0	0
Renewable electricity	9	11	12	13	16	16	19	20	21	23	27	29
<i>Of which road transport</i>	0	0	0	0	1	2	4	4	5	7	9	12
<i>Of which non-road transport</i>	9	11	12	12	15	15	15	15	16	16	17	17
Others (as biogas, vegetable oils, etc.) - please specify	0	0	0	0	0	0	0	0	0	0	0	0
<i>Of which biofuels⁶, cf. Article 21(2)</i>	0	0	0	0	0	0	0	0	0	0	0	0
Total	9	42	151	257	259	260	266	270	275	279	286	291

¹ Only biofuels and bioliquids meeting the sustainability criteria in the last subparagraph of Article 5(1) of Directive 2009/28/EC are taken into account.

² Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

³ From the whole amount of bioethanol/bio-ETBE.

⁴ Biofuels corresponding to the definition in Article 21(2) of Directive 2009/28/EC.

⁵ From the whole amount of biodiesel.

⁶ Biofuels corresponding to the definition in Article 21(2) of Directive 2009/28/EC.

Table 12: Estimation of total contribution expected from each renewable energy technology in Denmark to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in the transport sector 2010-2020

(PJ)⁷

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bioethanol/bio-ETBE	0.0	0.5	2.4	4.1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.9
<i>Of which, biofuels⁸, Article 21(2)</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.3</i>	<i>0.7</i>	<i>1.0</i>	<i>1.3</i>	<i>1.7</i>	<i>2.0</i>
<i>Of which imported⁹</i>	<i>0.0</i>	<i>0.5</i>	<i>2.4</i>	<i>4.1</i>	<i>4.0</i>	<i>4.0</i>	<i>4.0</i>	<i>4.0</i>	<i>4.0</i>	<i>4.0</i>	<i>4.0</i>	<i>3.9</i>
Biodiesel	0.0	0.8	3.5	6.1	6.2	6.2	6.4	6.5	6.6	6.7	6.9	7.0
<i>Of which biofuels¹⁰, Article 21(2)</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.5</i>	<i>1.1</i>	<i>1.7</i>	<i>2.2</i>	<i>2.9</i>	<i>3.5</i>
<i>Of which imported¹¹</i>	<i>0.0</i>	<i>0.8</i>	<i>3.5</i>	<i>6.1</i>	<i>6.2</i>	<i>6.2</i>	<i>6.4</i>	<i>6.5</i>	<i>6.6</i>	<i>6.7</i>	<i>6.9</i>	<i>7.0</i>
Hydrogen from renewable sources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity from renewable sources	0.4	0.5	0.5	0.5	0.7	0.7	0.8	0.8	0.9	1.0	1.1	1.2
<i>Of which road transport</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.1</i>	<i>0.2</i>	<i>0.2</i>	<i>0.2</i>	<i>0.3</i>	<i>0.4</i>	<i>0.5</i>
<i>Of which, other forms or transport</i>	<i>0.4</i>	<i>0.5</i>	<i>0.5</i>	<i>0.5</i>	<i>0.6</i>	<i>0.6</i>	<i>0.6</i>	<i>0.6</i>	<i>0.7</i>	<i>0.7</i>	<i>0.7</i>	<i>0.7</i>
Others (as biogas, vegetable oil etc.) – please specify	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Of which, biofuels¹² Article 21(2)</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>
Total	0.4	1.7	6.3	10.8	10.9	10.9	11.1	11.3	11.5	11.7	12.0	12.2

⁷ Only those biofuels and liquid biofuels that fulfil the sustainability criteria cf. Article 5(1) last paragraph of Directive 2009/28/EC.

⁸ Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

⁹ From the whole amount of bioethanol/bio-ETBE.

¹⁰ Biofuels corresponding to the definition in Article 21(2) of Directive 2009/28/EC.

¹¹ From the whole amount of biodiesel.

¹² Biofuels corresponding to the definition in Article 21(2) of Directive 2009/28/EC.