



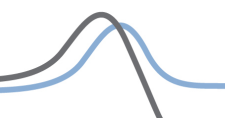
BNM M05: Electric Motors Government Standards Evidence Base 2009: Key Outputs

Version 1.1

This Briefing Note and referenced information is a public consultation document and will be used to inform Government decisions. The information and analysis forms part of the Evidence Base created by Defra's Market Transformation Programme.

1 Introduction

- The aim of this Briefing Note is to provide a year-by-year summary of the main outputs from the Market Transformation Programme (MTP) 2009 models.
- There are four main sections to this Briefing Note, corresponding to the main outputs from the MTP modelling:
 - Stock
 - Sales
 - Energy Consumption
 - Government Standards – Charts and Tables



2 Stock

- The following table details the MTP modelling outputs in terms of UK installed base of products:

Table 1 – Electric motors (0.75 – 400kW), Reference Scenario, stock

	Stock (000s)			
	AC Induction motors	PM & SR motors	AC & DC motors	Total
2000	9,980	0	920	10,900
2001	10,050	0	920	10,970
2002	10,120	0	930	11,050
2003	10,190	0	940	11,130
2004	10,260	0	940	11,200
2005	10,330	0	950	11,280
2006	10,400	0	960	11,360
2007	10,480	0	960	11,440
2008	10,550	0	970	11,520
2009	10,620	0	980	11,600
2010	10,690	0	980	11,670
2011	10,760	10	990	11,760
2012	10,830	10	1,000	11,840
2013	10,900	20	1,010	11,930
2014	10,970	30	1,010	12,010
2015	11,030	40	1,020	12,090
2016	11,100	60	1,030	12,190
2017	11,160	80	1,030	12,270
2018	11,210	100	1,040	12,350
2019	11,260	130	1,050	12,440
2020	11,310	160	1,060	12,530
2021	11,360	190	1,060	12,610
2022	11,410	220	1,070	12,700
2023	11,460	250	1,080	12,790
2024	11,510	280	1,090	12,880
2025	11,560	310	1,090	12,960
2026	11,620	350	1,100	13,070
2027	11,670	380	1,110	13,160
2028	11,720	410	1,120	13,250
2029	11,780	440	1,120	13,340
2030	11,840	460	1,130	13,430

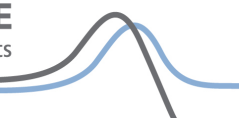


Table 2 – Electric motors (0.75 – 400kW), Policy Scenario, stock

	Stock (000s)			
	AC Induction motors	PM & SR motors	AC & DC motors	Total
2000	9,980	0	920	10,900
2001	10,050	0	920	10,970
2002	10,120	0	930	11,050
2003	10,190	0	940	11,130
2004	10,260	0	940	11,200
2005	10,330	0	950	11,280
2006	10,400	0	960	11,360
2007	10,480	0	960	11,440
2008	10,550	0	970	11,520
2009	10,620	0	980	11,600
2010	10,690	0	980	11,670
2011	10,760	10	990	11,760
2012	10,830	10	1,000	11,840
2013	10,900	20	1,010	11,930
2014	10,960	40	1,010	12,010
2015	11,010	70	1,020	12,100
2016	11,050	110	1,030	12,190
2017	11,080	150	1,030	12,260
2018	11,100	210	1,040	12,350
2019	11,130	270	1,050	12,450
2020	11,140	330	1,060	12,530
2021	11,140	410	1,060	12,610
2022	11,150	480	1,070	12,700
2023	11,150	570	1,080	12,800
2024	11,140	650	1,090	12,880
2025	11,140	740	1,090	12,970
2026	11,140	820	1,100	13,060
2027	11,150	900	1,110	13,160
2028	11,160	970	1,120	13,250
2029	11,180	1,040	1,120	13,340
2030	11,190	1,110	1,130	13,430

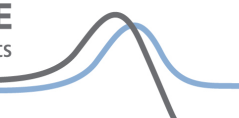


Table 3 – Electric motors (0.75 – 400kW), BAT Scenario, stock

	Stock (000s)			
	AC Induction motors	PM & SR motors	AC & DC motors	Total
2000	9,980	0	920	10,900
2001	10,050	0	920	10,970
2002	10,120	0	930	11,050
2003	10,190	0	940	11,130
2004	10,260	0	940	11,200
2005	10,330	0	950	11,280
2006	10,400	0	960	11,360
2007	10,480	0	960	11,440
2008	10,550	0	970	11,520
2009	10,620	0	980	11,600
2010	10,220	480	980	11,680
2011	9,810	960	990	11,760
2012	9,400	1,450	1,000	11,850
2013	8,980	1,940	1,010	11,930
2014	8,570	2,430	1,010	12,010
2015	8,150	2,930	1,020	12,100
2016	7,720	3,430	1,030	12,180
2017	7,300	3,940	1,030	12,270
2018	6,870	4,440	1,040	12,350
2019	6,440	4,950	1,050	12,440
2020	6,120	5,350	1,060	12,530
2021	5,930	5,620	1,060	12,610
2022	5,850	5,780	1,070	12,700
2023	5,890	5,820	1,080	12,790
2024	5,930	5,860	1,090	12,880
2025	5,970	5,910	1,090	12,970
2026	6,010	5,950	1,100	13,060
2027	6,060	5,990	1,110	13,160
2028	6,100	6,030	1,120	13,250
2029	6,140	6,070	1,120	13,330
2030	6,180	6,120	1,130	13,430



3 Sales

- The following table details the MTP modelling outputs in terms of annual UK sales:

Table 4 - Electric motors (0.75 – 400kW), Reference Scenario, sales

	Sales (000s)			
	AC Induction motors	PM & SR motors	AC & DC motors	Total
2000	840	0	80	920
2001	850	0	80	930
2002	850	0	80	930
2003	860	0	80	940
2004	860	0	80	940
2005	860	0	80	940
2006	870	0	80	950
2007	870	0	80	950
2008	880	0	80	960
2009	880	0	80	970
2010	890	0	80	970
2011	890	0	80	970
2012	900	10	80	990
2013	910	10	80	1,000
2014	910	10	80	1,000
2015	910	10	90	1,010
2016	920	20	90	1,030
2017	920	20	90	1,030
2018	920	20	90	1,030
2019	920	30	90	1,040
2020	930	30	90	1,050
2021	930	30	90	1,050
2022	940	40	90	1,070
2023	940	40	90	1,070
2024	950	40	90	1,080
2025	950	40	90	1,080
2026	960	40	90	1,090
2027	960	40	90	1,090
2028	970	50	90	1,110
2029	970	50	90	1,110
2030	980	50	90	1,120

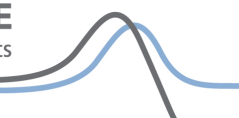


Table 5 - Electric motors (0.75 – 400kW), Policy Scenario, sales

	Sales (000s)			
	AC Induction motors	PM & SR motors	AC & DC motors	Total
2000	840	0	80	920
2001	850	0	80	930
2002	850	0	80	930
2003	860	0	80	940
2004	860	0	80	940
2005	860	0	80	940
2006	870	0	80	950
2007	870	0	80	950
2008	880	0	80	960
2009	880	0	80	960
2010	890	0	80	970
2011	890	0	80	970
2012	900	10	80	990
2013	900	10	80	990
2014	900	20	80	1,000
2015	900	30	90	1,020
2016	890	40	90	1,020
2017	890	50	90	1,030
2018	890	50	90	1,030
2019	890	60	90	1,040
2020	890	70	90	1,050
2021	890	80	90	1,060
2022	890	80	90	1,060
2023	890	90	90	1,070
2024	890	100	90	1,080
2025	890	100	90	1,080
2026	900	100	90	1,090
2027	900	110	90	1,100
2028	910	110	90	1,110
2029	910	110	90	1,110
2030	910	120	90	1,120

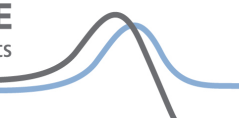
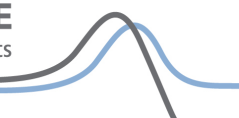


Table 6 - Electric motors (0.75 – 400kW), BAT Scenario, sales

	Sales (000s)			
	AC Induction motors	PM & SR motors	AC & DC motors	Total
2000	840	0	80	920
2001	850	0	80	930
2002	850	0	80	930
2003	860	0	80	940
2004	860	0	80	940
2005	860	0	80	940
2006	870	0	80	950
2007	870	0	80	950
2008	880	0	80	960
2009	880	0	80	960
2010	890	0	80	970
2011	890	0	80	970
2012	900	10	80	990
2013	900	10	80	990
2014	900	20	80	1,000
2015	900	30	90	1,020
2016	890	40	90	1,020
2017	890	50	90	1,030
2018	890	50	90	1,030
2019	890	60	90	1,040
2020	890	70	90	1,050
2021	890	80	90	1,060
2022	890	80	90	1,060
2023	890	90	90	1,070
2024	890	100	90	1,080
2025	890	100	90	1,080
2026	900	100	90	1,090
2027	900	110	90	1,100
2028	910	110	90	1,110
2029	910	110	90	1,110
2030	910	120	90	1,120



- In most cases, the sales are estimated and do not refer to actual market data. They are outputs based upon stock and lifetime inputs.
- Please refer to the relevant Key Inputs GSBN for further details of actual sales/stock data used to calibrate the model.

4 Energy Consumption

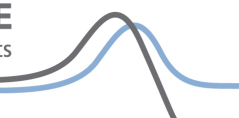
- The following tables detail the MTP modelling outputs in terms of annual UK energy consumption.
- Note: The policy energy consumption corresponds to the Government Standards. All scenarios are the same until 2009.

Table 7 - Electric motors (0.75 – 400kW), Reference Energy Consumption

	Reference energy consumption (GWh)			
	AC induction motors	PM & SR motors	AC & DC motors	Total
2000	118,500	0	11,080	129,580
2001	118,960	0	11,130	130,100
2002	119,400	0	11,190	130,590
2003	119,800	0	11,240	131,040
2004	120,160	0	11,300	131,460
2005	120,500	0	11,360	131,850
2006	120,820	0	11,410	132,240
2007	121,130	0	11,480	132,600
2008	121,420	0	11,540	132,960
2009	121,700	20	11,610	133,320
2010	121,930	40	11,680	133,650
2011	122,090	70	11,750	133,910
2012	122,150	120	11,820	134,090
2013	122,200	180	11,900	134,280
2014	122,230	260	11,970	134,460
2015	122,070	360	12,050	134,490
2016	121,850	500	12,130	134,470
2017	121,580	660	12,210	134,450
2018	121,300	850	12,300	134,450
2019	121,050	1,070	12,380	134,510
2020	120,800	1,330	12,470	134,590
2021	120,600	1,590	12,550	134,740

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2022	120,450	1,850	12,640	134,940
2023	120,360	2,120	12,730	135,200
2024	120,320	2,390	12,810	135,520
2025	120,340	2,670	12,900	135,910
2026	120,440	2,940	12,990	136,370
2027	120,620	3,200	13,080	136,910
2028	120,870	3,460	13,170	137,490
2029	121,170	3,710	13,260	138,140
2030	121,550	3,950	13,350	138,850

Table 8 - Electric motors (0.75 – 400kW), Policy Energy Consumption

	Policy energy consumption (GWh)			
	AC induction motors	PM & SR motors	AC & DC motors	Total
2009	121,700	20	11,610	133,330
2010	121,920	40	11,680	133,640
2011	122,040	80	11,750	133,870
2012	122,030	130	11,820	133,980
2013	121,990	210	11,900	134,100
2014	121,880	350	11,970	134,200
2015	121,520	600	12,050	134,170
2016	121,050	930	12,130	134,110
2017	120,510	1,320	12,210	134,040
2018	119,930	1,760	12,300	133,990
2019	119,350	2,260	12,380	133,990
2020	118,660	2,850	12,470	133,980
2021	118,020	3,460	12,550	134,030
2022	117,360	4,120	12,640	134,120
2023	116,740	4,820	12,730	134,290
2024	116,130	5,560	12,810	134,500
2025	115,610	6,280	12,900	134,790
2026	115,220	6,950	12,990	135,160
2027	114,890	7,620	13,080	135,590
2028	114,690	8,230	13,170	136,090
2029	114,570	8,830	13,260	136,660
2030	114,500	9,410	13,350	137,260

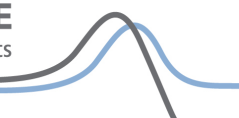
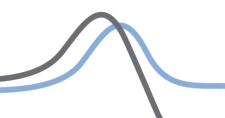


Table 9 - Electric motors (0.75 – 400kW), Best Available Technology Energy Consumption

	Best Available Technology energy consumption (GWh)			
	AC induction motors	PM & SR motors	AC & DC motors	Total
2009	121,700	20	11,610	133,330
2010	116,320	4,100	11,680	132,100
2011	110,880	8,210	11,750	130,840
2012	105,360	12,350	11,820	129,530
2013	99,840	16,510	11,900	128,250
2014	94,340	20,710	11,970	127,020
2015	88,860	24,940	12,050	125,850
2016	83,410	29,190	12,130	124,730
2017	78,020	33,480	12,210	123,710
2018	72,680	37,790	12,300	122,770
2019	67,420	42,130	12,380	121,930
2020	63,430	45,490	12,470	121,390
2021	60,730	47,840	12,550	121,120
2022	59,330	49,190	12,640	121,160
2023	59,220	49,540	12,730	121,490
2024	59,230	49,880	12,810	121,920
2025	59,350	50,230	12,900	122,480
2026	59,550	50,580	12,990	123,120
2027	59,830	50,940	13,080	123,850
2028	60,160	51,290	13,170	124,620
2029	60,520	51,650	13,260	125,430
2030	60,920	52,020	13,350	126,290



4.1 Differences in energy consumption compared to last published figures

- The total energy consumption figures vary from previously published figures for two reasons:
 - Change in the size range of motors included in the model. Previous figures included the energy consumption of all electric motors in industrial and commercial applications. The current model only includes motors in the size range 0.75 through 400kW since these account for the majority of electricity consumption in electric motors, estimated at 89% of all electric motor consumption in industrial and commercial applications.
 - Energy savings due to policies applied to fans and pumps are not included in the Policy scenario or BAT scenario; the savings due to policy measures for fans and pumps are likely to exceed the savings in electric motors. In the future figures for fans and pumps will be presented separately.

5 Government Standards

- As part of its commitments in May 2007's Energy White Paper, the government, via its Market Transformation Programme, is obliged to "publish a series of consultation papers setting out [its] analysis of how the performance of energy-using products will need to improve over the next 10-20 years, including proposals for product standards and targets to phase out the least efficient products"
- In 2010, the Government published its product policy analysis and projections document. The proposals for product standards which would achieve the policy scenario for products in the Motors & circulators annexe of this document are given below. These are represented in both graphical and tabular form, in order to be helpful to a wide range of audiences.

5.1 Charts

- The following charts illustrate the expected market distribution over time of the products addressed against the relevant efficiency metric for that product. Exact presentation of these charts will vary between product areas, due to variation in efficiency metrics applicable.

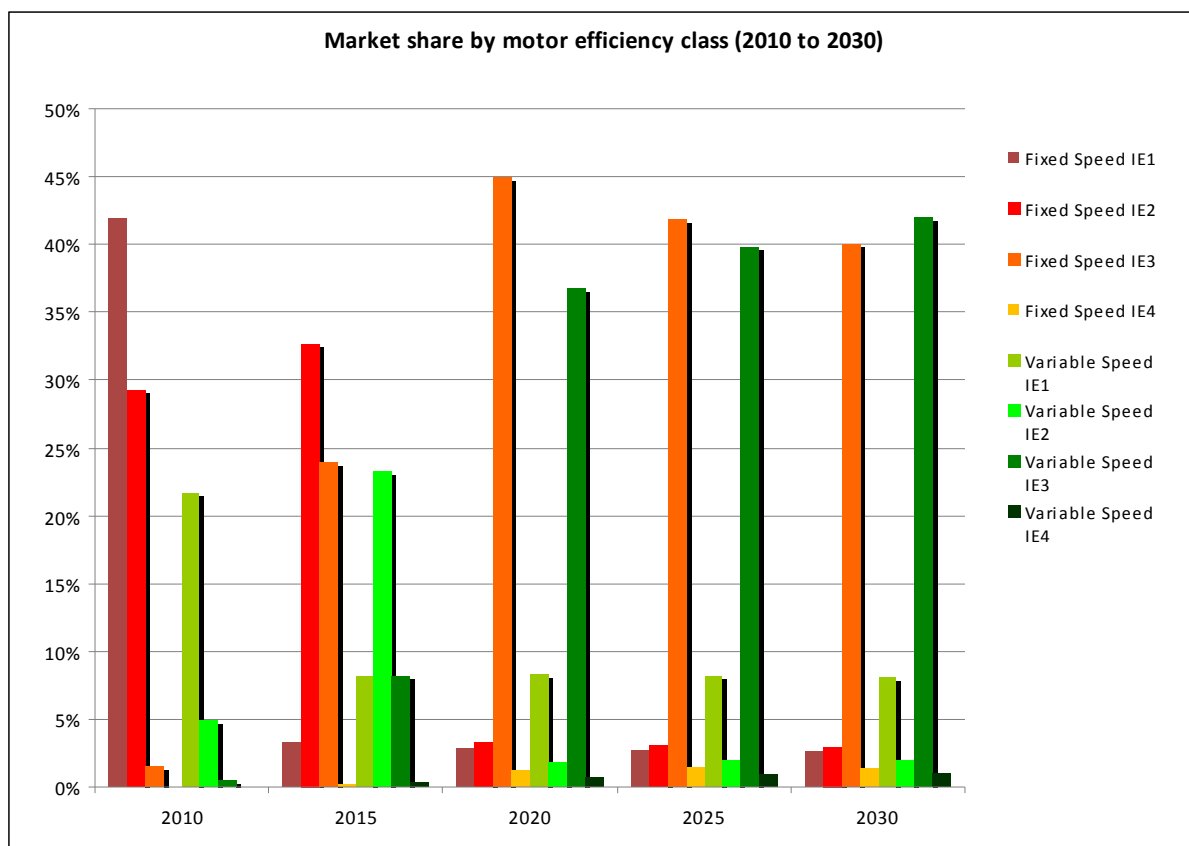


Figure 1 - Expected sales distribution by IEC Efficiency class, fixed speed & variable speed application, electric motors (0.75 – 400kW)

5.2 Tables

- The market distributions illustrated in the previous section, translate to measurements of average sales efficiency over time (stated in terms of efficiency, power consumption or efficiency formulae for example).
- The following tables illustrate the expected change in average efficiency over time of the products addressed. Note: These tables reflect one possible mix of sales distributions to achieve the Government Standards.
- Sales and efficiencies of 'other AC & DC' motors are assumed to remain constant under the Reference, Policy and BAT Scenarios, therefore no Government Standards are presented for this class of motors.

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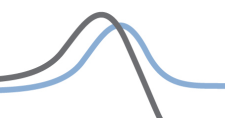


Table 10 - Electric motors (0.75 – 400kW) in fixed speed applications, Government Standard Sales Market Average Efficiency

Motor Type	Average Efficiency (%) - (Fixed Speed Motors)					
	AC Induction					
Motor Size Group (kW)	0.75-2.2	3-4	5.5-11	15-30	37-132	150-400
2009	81.10	84.35	87.42	90.40	93.48	95.43
2010	82.21	85.24	88.03	90.86	93.74	95.54
2011	83.55	86.33	88.79	91.45	94.09	95.69
2012	85.16	87.63	89.68	92.14	94.49	95.86
2013	85.23	87.69	89.74	92.18	94.52	95.87
2014	85.33	87.78	89.83	92.25	94.57	95.89
2015	85.46	87.90	90.10	92.97	95.08	96.08
2016	85.61	88.03	90.10	92.97	95.08	96.08
2017	86.41	88.77	90.72	92.97	95.08	96.08
2018	86.43	88.78	90.72	92.97	95.08	96.08
2019	86.44	88.79	90.72	92.97	95.08	96.08
2020	86.46	88.81	90.72	92.97	95.08	96.08
2021	86.47	88.82	90.72	92.97	95.08	96.08
2022	86.47	88.82	90.72	92.97	95.08	96.08
2023	86.47	88.82	90.72	92.97	95.08	96.08
2024	86.47	88.82	90.72	92.97	95.08	96.08
2025	86.47	88.82	90.72	92.97	95.08	96.08
2026	86.47	88.82	90.72	92.97	95.08	96.08
2027	86.47	88.82	90.72	92.97	95.08	96.08
2028	86.47	88.82	90.72	92.97	95.08	96.08
2029	86.47	88.82	90.72	92.97	95.08	96.08
2030	86.47	88.82	90.72	92.97	95.08	96.08

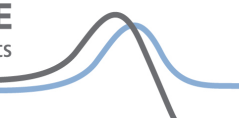
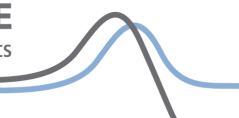


Table 11 - Electric motors (0.75 – 400kW) in variable speed applications, Government Standard Sales Market Average Efficiency

Motor Type	Average Efficiency (%) - (Variable Speed Motors)							
	AC Induction						Permanent Magnet & Switched Reluctance	
	0.75-2.2	3-4	5.5-11	15-30	37-132	150-400	0.75-30	30-400
2009	74.93	78.22	81.34	84.34	87.45	89.43	85.44	89.32
2010	74.97	78.25	81.36	84.36	87.47	89.44	85.44	89.32
2011	76.86	79.76	82.38	85.14	87.91	89.62	85.44	89.32
2012	79.05	81.52	83.59	86.06	88.44	89.85	85.44	89.32
2013	79.13	81.60	83.66	86.12	88.48	89.86	85.44	89.32
2014	79.18	81.65	83.70	86.15	88.50	89.87	85.44	89.32
2015	79.27	81.73	83.73	86.21	88.55	89.88	85.44	89.32
2016	79.29	81.74	83.76	86.22	88.55	89.89	85.44	89.32
2017	79.32	81.77	83.81	86.24	88.57	89.89	85.44	89.32
2018	79.33	81.78	83.82	86.25	88.57	89.90	85.44	89.32
2019	79.34	81.79	83.83	86.25	88.58	89.90	85.44	89.32
2020	80.53	82.88	84.83	87.06	89.15	90.11	85.44	89.32
2021	80.53	82.88	84.83	87.06	89.15	90.11	85.44	89.32
2022	80.53	82.88	84.83	87.06	89.15	90.11	85.44	89.32
2023	80.53	82.88	84.83	87.06	89.15	90.11	85.44	89.32
2024	80.53	82.88	84.83	87.06	89.15	90.11	85.44	89.32
2025	80.53	82.88	84.83	87.06	89.15	90.11	85.44	89.32
2026	80.53	82.88	84.83	87.06	89.15	90.11	85.44	89.32
2027	80.53	82.88	84.83	87.06	89.15	90.11	85.44	89.32
2028	80.53	82.88	84.83	87.06	89.15	90.11	85.44	89.32
2029	80.53	82.88	84.83	87.06	89.15	90.11	85.44	89.32
2030	80.53	82.88	84.83	87.06	89.15	90.11	85.44	89.32



Related MTP information

- BNM M01: Electric Motors Government Standards Evidence Base 2009: Key Inputs
- BNM M02: Electric Motors Government Standards Evidence Base 2009: Reference Scenario
- BNM M03: Electric Motors Government Standards Evidence Base 2009: Policy Scenario
- BNM M04: Electric Motors Government Standards Evidence Base 2009: Best Available Technology (BAT) Scenario

Changes from previous version

- Text changes on page 11.
- Minor changes to the template.

Consultation and further information

Stakeholders are encouraged to review this document and provide suggestions that may improve the quality of information provided, email info@mtprog.com quoting the document reference, or call the MTP enquiry line on +44 (0) 845 600 8951.

For further information on related issues visit <http://efficient-products.defra.gov.uk>