

<p><b>Title:</b> The Control of Electromagnetic Fields at Work Regulations 2016</p> <p><b>PIR No:</b> HSEPIR011</p> <p><b>Original IA/RPC No:</b> HSE 0093</p> <p><b>Lead department or agency:</b> HSE</p> <p><b>Other departments or agencies:</b> DWP</p> <p>Contact for enquiries: richard.broughton@hse.gov.uk</p>	<b>Post Implementation Review</b>
	<b>Date:</b> 01/07/2021
	<b>Type of regulation:</b> Domestic
	<b>Type of review:</b> Statutory
	<b>Date measure came into force:</b> 01/07/2016
	<b>Recommendation:</b> Keep
	<b>RPC Opinion:</b> Green

## Introduction

The Control of Electromagnetic Fields at Work Regulations (EMF 2016) came into force on 1 July 2016. They transposed the European Physical Agents (Electromagnetic Fields) Directive 2013/35/EU which, as a then member of the European Union (EU), the UK was required to do. Directive 2013/35/EU<sup>1</sup> is the fourth in a sequence of directives that amend the European Commission's original 1993 proposal for a physical agents Directive, regarding the exposure of workers to the risks arising from noise, vibration, artificial optical radiation and electromagnetic fields. Its objectives are to ensure

- There is a harmonised regime across all EU member states;
- Dutyholders take action to minimise and control the risks from EMFs; and
- All workers remain protected.

An electromagnetic field (EMF) is a type of non-ionising radiation that occurs naturally in the environment and is created whenever electrical energy is used. Exposure to high levels of EMFs can give rise to effects that may be irritating or unpleasant, or sometimes harmful and cause burns. The Directive dealt only with short-term/immediate effects of EMFs, as there is no evidence of long-term effects.

Prior to the Directive, risks from EMFs in GB workplaces were managed using existing legislation: the Health and Safety at Work Act etc. 1974 (HSWA) and the Management of Health and Safety at Work Regulations 1999 (Management Regulations). Feedback from stakeholders all through the negotiation was that this legislative framework was sufficient. It was therefore expected the Directive would deliver few, if any, additional health and safety benefits.

The implementation of the Directive through the EMF Regulations (and the EMF guidance) sought to ensure workers remain protected, and the burdens on businesses minimised, through practical assessment of exposure levels, proportionate risk management and exemptions cognisant of existing legislative requirements.

<sup>1</sup> Whenever 'the Directive' is used within this document it is reference to Directive 2013/35/EU – on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields).

It is a statutory requirement within EMF 2016 to undertake a Post Implementation Review (PIR) within 5 years of them coming into force. The purpose of a PIR is to evaluate whether or not the intended objectives of the regulations have been met.

This is a report summarising the evidence gathered from stakeholders and HSE enforcement data to inform whether EMF 2016 achieved its initial objectives; updating the costs estimates from the final impact assessment; and, whether the EMF 2016 regulations are the best approach to help employers control the risks to health associated with EMFs.

## **1. What were the policy objectives of the measure?**

Throughout negotiation of the Directive, the UK maintained that the existing legislative framework was sufficient and specific legislation on EMFs unnecessary. Evidence considered at the time suggested EMFs were being managed satisfactorily using the Framework Directive (89/391/EEC) for workplace health and safety and additionally, in the UK, through the general duties in HSWA and the Management Regulations (Northern Ireland has equivalent legislation in place). Through these regulations, dutyholders were already obliged to manage *all* hazards in the workplace, which include those resulting from EMFs, through risk assessment and adoption of proportionate control measures that reduce the risks to as low a level as is reasonably practicable.

The rationale for the transposition approach took full account of the UK Government's Guiding Principles for EU Legislation and a commitment to regulating only where it is necessary to do so. Therefore, the new proposed EMF regulations were designed to cover *only* the requirements of the Directive not already covered by current domestic legislation.

These considerations informed the policy objectives in the final impact assessment:

- Follow government policy and transpose the Directive in line with EU Treaty obligations;
- Ensure workers remain protected from adverse health and safety risks by ensuring exposure to EMFs continues to be assessed and controlled where necessary; and
- Ensure existing control measures already in place are taken into account so any burdens on businesses are minimised.

The intended effect was to implement the Directive in a way that was proportionate to the risks and by taking into account existing controls minimising the impact on businesses. To this end the following objectives were detailed in EMF 2016's Explanatory Memorandum and meant, in practice, the following outcomes would be achieved:

- The exposure of employees to EMFs is below specified limits, unless a relevant exception applies;
- Dutyholders minimise the risks to workers arising from their exposure to EMFs; and
- Where exposure is allowed to exceed the exposure limits, the risks posed by that exposure are adequately controlled.

As there was already a requirement in law to control all hazards including EMFs, through an assessment of the risks, EMF 2016 only contained those requirements in the Directive not covered by existing legislation. Given this, few benefits were anticipated at transposition.

## **2. What evidence has informed this PIR?**

A light-touch approach was agreed by HSE's Regulation Committee and Evaluation Governance Group for the research to inform this PIR. This was based on the following evidence base:

- a) The estimated equivalent annual net cost to business (EANCB) of £1.7m;
- b) The electromagnetic fields at work microsite web hits were at 700 – 1000 per month (Jan – June 2019), with only 14 enquiries over the same period;
- c) There were only 48 responses to the consultation, with 83% of respondents supporting the proposed transposition approach; and
- d) Feedback from stakeholders, at the time of implementation, was that the legislative framework prior to EMF 2016 was sufficient (based on pre-consultation feedback and the 83% of consultation respondents supporting HSE's approach). It was therefore expected that EMF 2016 would have delivered few benefits.

The light touch approach informed the decision to gather views for the PIR via an on-line survey only. Whilst electromagnetic fields can manifest, to some extent, wherever electricity is generated the main employer groups affected are easily identified and were engaged via an Implementation Working Group during the EMF 2016 development. HSE also has a radiation web communities platform, a well-established method HSE uses to communicate with stakeholders. These groups together with respondents to the original consultation were invited to complete the on-line survey. HSE officials also reviewed HSE's enforcement databases for the period 2016 – present and the 5-years prior to EMF 2016 coming into force.

The survey ran from 25 November 2020 until 2 December 2020.

The survey sought to gather views from duty holders and other stakeholders on the effectiveness of the regulations to inform the PIR. The survey addressed key questions for the review such as whether the regulations had any positive or negative impacts on stakeholders.

Due to low response numbers for welders (a main group identified as being impacted by the EMF changes), and small businesses with fewer than 5 employees indicating how long it took to undertake an EMF exposure assessment and update the necessary risk assessment(s) during the initial survey period (Nov to Dec 2020), the survey was re-issued for two weeks during February 2021. To target both groups, HSE worked with the publication 'Welding World' and an advertorial in the February 2021 edition encouraged welders to complete focussed questions.

The principal data collection approaches used to gather evidence for this PIR were:

- The survey was uploaded and completed via HSE's on-line web communities' portal for those who work with radiation. There are currently over 600 members of the community.
- All members of the community were alerted by a bespoke communication from the manager of this community, an HSE principle specialist inspector of radiation.
- The industry Implementation Working Group that engaged on the development of the Regulations was also used to disseminate the survey among the sectors they represent.
- All those who responded to the consultation on the development of the 2016 regulations were also emailed.
- The survey was reissued to targeted groups to examine further some of the evidence collected during the main survey.
- This survey targeted small businesses via the welding sector through an advertorial in the publication Welding World and an email to members of its mailing list encouraging the sector to complete the survey. This had the potential to reach around 68,000 contacts.
- The initial survey received 139 responses from across the sector, the second survey targeting the welding sector received 17 responses resulting in 156 responses across the two surveys.

- HSE's Enforcement/Prosecution data has also been analysed.

### 3. To what extent have the policy objectives been achieved?

EMF 2016 was transposed and came into effect 30 June 2016. The objective to transpose the Directive in line with EU treaty obligations has therefore been met.

The second objective was to ensure workers remain protected from adverse health and safety risks by ensuring exposure to EMFs continues to be assessed and controlled where necessary. The evidence collected for this PIR, as discussed in Annex 1, focused specifically on the Explanatory Memorandum objective of *minimising* the risk to workers. The following conclusions are based on a reasonable inference of this evidence on the question of whether EMF 2016 also managed to *maintain* existing protection from adverse EMF risks, as the impact assessment objective describes.

A majority of respondents to the survey agreed that EMF 2016 ensures that the exposure of employees to EMFs is below specified limits (unless a relevant exception applies); agreed that EMF 2016 ensures that businesses minimise the risks to workers from exposure to EMFs; and, agreed that where exposure is allowed to exceed the exposure limits, the risks posed by that exposure are adequately controlled. A majority of respondents therefore consider EMF 2016 ensures exposure is assessed and controlled so protecting workers from adverse effects. This is not, however, an overwhelming majority.

A number of respondents disagreed EMF 2016 ensured protections through assessments and control. The main reasons given were that the regulations were complex, not well-understood, and that there was a general lack of awareness.

The third objective was in two parts: first to ensure existing control measures in place are taken into account so that second, burdens on business were minimised. On the first, HSE worked closely with the main sectors affected by the regulations during the development of EMF 2016 to explain that exposure to EMFs should already be controlled via the general duties to control risk in HSWA and the Management Regulations. There was general support for this. EMF 2016 does not, therefore, include those parts of the Directive covered by these general duties. As such, it was thought the regulations would deliver little benefit. However, a majority of respondents to the survey, as part of this PIR, now suggest EMF 2016 itself ensured control of exposures. There was no appetite from a majority of respondents for control of EMFs to be via the general legal duties alone.

On the second part of this objective, the survey carried out as part of this PIR during November and December 2020 asked specifically about the original cost assumptions in the final IA. This provided evidence that the final IA for EMF 2016 underestimated the costs to business. There were, however, low responses from the welding sector (a sector identified as being one most affected by the new regulations) as well as those businesses employing fewer than 5 people indicating how long it took to assess exposure and update risk assessments. The survey was therefore reissued to gather more evidence from these two groups by targeting specifically the welding sector where there are a number of small operators. This would also serve to increase the overall sample size. This did not overturn the conclusion on costs from the initial survey. There are uncertainties in these costs (considered further in later sections of this PIR and in the cost benefit analysis) but the further evidence that dutyholders found the regulations complex and hard to understand (see Section 6 on opportunities to reduce burdens) provide some evidence the objective of minimising burdens on business was not met.

A further thorough cost benefit analysis was carried out confirming that the revised costs are now slightly above the *de minimis* threshold. Details of the cost assumptions and the revision are in (4) below.

An examination of HSE’s prosecutions databases, both prior to the regulations coming into force and subsequent, has shown there has been no enforcement activity associated with failures to comply with duties in the regulations. While this may indicate a high level of compliance, it is not possible to confirm this is a direct consequence of the Regulations. It may be a consequence of HSE operational priorities.

#### 4. What were the original assumptions?

##### Original assumptions about the costs and benefits in the final IA.

All costs identified in the 2016 IA relate to the amount of a business’s time compliance with EMF 2016 would take. Table 1 below sets out the time-impact per business of EMF 2016 estimated in the 2016 IA.

**Table 1**

Assumption	Estimate (time)
Scoping	10 minutes
Familiarisation	1 hour – 2 hours
Assessing exposure and updating risk assessments	30 minutes – 1 hour

The monetised costs of EMF 2016 (presented in 2015 prices and 2016 present values) were estimated to be:

- Scoping – one-off costs of **£3.75m**
- Familiarisation – total costs of **between £7.06m and £8.64m with a best estimate of £7.85m over the appraisal period**
- Assessment of exposure levels and updating risk assessments – total costs of **between £3.11m and £3.80m with a best estimate of £3.46m over the appraisal period**

The total cost of EMF 2016 was estimated to be **£15.05m** over the appraisal period. The total cost to business over the appraisal period was estimated to be **£15.00m**. The cost to the public sector was estimated to be **£0.06m** over the appraisal period. The equivalent annual net cost to business (EANCB) was estimated as **£1.7m** (2014 prices, 2015 present value).

The 2016 IA did not identify any direct benefits to business. This was because feedback from stakeholders at the time of the development of EMF 2016 indicated that the existing legislative framework was enough. This was based on pre-consultation feedback and 83% of consultation respondents supporting HSE’s approach to only transpose those requirements in the Directive not covered by this existing legislation. It was therefore expected EMF would deliver few direct health and safety benefits. Indirect benefits were not monetised.

A more detailed discussion of costs and benefits identified by the 2016 IA can be found in the cost benefit analysis at annex 2.

##### Actual costs and benefits of the regulation and its effects on business.

Evidence collected for this PIR generally suggested that the 2016 IA underestimated the time-impact per business of EMF 2016. Table 2 below compares time estimates from the 2016 IA and this PIR.

**Table 2**

Assumption	Time estimate from the 2016 IA	Time estimate based on survey data for this PIR
Scoping	10 minutes	30 minutes
Familiarisation	1 hour – 2 hours	2 hours – 4 hours
Assessing exposure and updating risk assessments	30 minutes – 1 hour	3 hours – 4 hours

For consistency with the 2016 IA, cost estimates for this PIR are presented in 2015 prices and 2016 present values. Revised estimates of the monetised costs of EMF 2016 are:

- Scoping – one-off costs **of approximately £13m**
- Familiarisation – total present value costs **of approximately £17m**
- Assessment of exposure levels and updating risk assessments – total present value costs **of approximately £22m**

Revised estimates for this PIR suggest total costs of **£52m** over the appraisal period. Costs to business are estimated to also be **£52m** over the appraisal period. Costs to the public sector are estimated to be **£0.14m** over the appraisal period. The EANCB is estimated to be **£6.0m** (2015 prices, 2016 present value). While the number of businesses in scope of EMF 2016 also grew more quickly than that IA anticipated, the increase in costs is largely driven by an increase in the estimated time-impact of EMF 2016.

Potential explanations for this are:

- Guidance may not have been as clear as expected
- Industry time estimates in 2016 may have been influenced by optimism bias, whereas revised estimates are based on actual experience
- The averages calculated may have been influenced by responses from respondents who have included costs for things they should have already been doing under general duties

While the revised cost estimates are greater by a factor of 3.5, it is important to note that there is some degree of uncertainty in cost estimates, and they have remained in the same order of magnitude as the original IA. In addition, and importantly, the survey shows an increase in costs above that originally expected. More thorough discussions would be needed with duty holders to improve the certainty around these estimates. This could be explored as part of any future work on guidance.

The majority of respondents to the PIR survey felt that there have been some benefits of EMF 2016 in contrast to the expectation of the IA. These are not monetised for reasons described in Section 7 of Annex 2. Whether they are real additional benefits, as a result of EMF 2016, or have been achieved from improved compliance with the existing general duties would need more in-depth analysis.

A more detailed discussion of costs and benefits estimated in this PIR can be found in Annex 2.

Assessment of risks or uncertainties in evidence base

EMFs are ubiquitous and generated wherever electricity is used. Evidence gathering (qualitative and quantitative) for the impact of EMF 2016 therefore targets those sectors most affected to ensure the evaluation is not skewed towards those for whom this workplace risk is not significant. In addition, this evaluation gathered responses primarily from large organisations with small/micro businesses being under-represented despite the reissued survey targeting the small business sector specifically via the welding sector. Gathering a greater view of small and micro businesses would require a much more detailed and involving evaluation approach.

#### Lessons for future Impact Assessments

A cost-assessment as part of a PIR will, in contrast to a final stage IA, gather information on costs after the regulations have been in force and employers are complying with their duties. The original estimates are therefore tested with real world experience. It should perhaps not be surprising if, as part of a PIR cost-assessment, the original assumptions are found to be too low (or indeed too high). If there is a lesson to be learned it is to first be prepared for this but second and arguably more importantly, give thought to what scale of under-estimation is problematic. As an example, an order of magnitude error may likely be of more concern than a factor of two or three or remaining overall within an order of magnitude of original estimates.

#### **5. Were there any unintended consequences?**

Out of the 156 respondents to the survey, almost half (46%, 72) provided some sort of comment about the unintended consequences of the EMF 2016 regulations, even if it was only to indicate they did not think there were any. Of these 72 responses, 64 (89%) were substantive.

Nearly half of those responding reported that they had experienced 'no/none' unintended consequences. The only other issues which were mentioned multiple times were the increase in risk awareness around EMF, and the need to replace equipment. The comments about the greater awareness of the risks presented by EMFs came from people working in large employers (more than 1000+ employees). In general, larger organisations tend to be more risk aware within their main risks having dedicated health and safety functions and managers. Consideration might be given to how these duty holders are informed about existing control measures.

Generally, in terms of the unintended consequences over half (55%) were neutral, about a third were negative (35%) and only one in ten (9%) were positive.

#### **6. Has the evidence identified any opportunities for reducing the burden on business?**

Most respondents agreed that the EMF 2016 objectives as identified and detailed in the Explanatory Memorandum have been achieved. Whilst respondents provided a variety of examples in terms of unintended consequences, non-IA costs, benefits and other comments in respect of the regulations, the top response was 'no', 'none' and 'not applicable'. A number of respondents indicated that there had been benefits from EMF 2016, with examples including:

- Increased awareness of the risks of EMFs for workers;
- The legislation provides reassurance to staff around EMF safety; and
- Greater regulatory clarity.

In addition, respondents felt that the EMF 2016 objectives could not be achieved with a system that imposed less regulation and indicated that EMF 2016 was still needed. Though the predictive estimates from the EMF 2016 impact assessment (IA) were updated with observed figures, leading to an increase in the equivalent annual net cost (EANCB) of EMF 2016 to £6.0

million from the original 2016 estimate of £1.7 million this increase remains well within an order of magnitude.

On this basis the conclusion from this first PIR of EMF 2016 is that they remain fit for purpose and that they be formally reviewed again in 5 years.

However, some respondents did consider the regulations complex, hard to understand, and a lack of awareness of the hazard and risk from EMF remained. In addition, the final IA underestimated the costs to business by around a factor of 3.5.

The evidence gathered provides reasons for the reported increase in costs. First, some responses noted the complexity of the regulations and the difficulty in understanding them. This seems to be reflected in the time taken by an employer to scope out and familiarise themselves with EMF 2016. Second, the assumptions made for the time to assess exposure and carry out a risk assessment were particularly underestimated. This suggests supporting guidance may not be clear enough, and some respondents did note a need for 'better guidance'.

Subject to on-going priorities, available resources and external stakeholder support a future examination of EMF 2016 could consider options for simplifying the regulations as well as the scope for better more targeted guidance.



**Post Implementation Review (PIR) of  
The Control of Electromagnetic Fields at  
Work Regulations 2016  
(SI 2016/588)**

**Annex 1 - Evidence Review**

## SUMMARY

- Regulation 15 of The Control of Electromagnetic Fields at Work Regulations 2016, (SI 2016/588) ('EMF 2016') requires a review is carried out and published by the 30<sup>th</sup> June 2021.
- The review – known as a post-implementation review (PIR) – requires that the objectives of EMF 2016 be set out, assessed to see whether they have been achieved and whether they can be achieved with less regulation.
- The objectives of EMF 2016 were *“to ensure that: the exposure of employees to EMFs is below specified limits, unless a relevant exception applies; dutyholders minimise the risks to workers arising from their exposure to EMFs; and where exposure is allowed to exceed the exposure limits, the risks posed by that exposure are adequately controlled”*.
- A light-touch quantitative research approach was employed to collect primary evidence. This consisted of an on-line survey being sent to a mixed group of stakeholders; in total the survey went directly to approximately 700 contacts. In order to expand and clarify some of the evidence gathered in the initial survey phase, the survey was subsequently re-distributed to two welder trade associations. In total the online surveys received 156 full and partial responses.
- Most respondents agreed that the EMF 2016 objectives as identified and detailed in the Explanatory Memorandum have been achieved.
- While respondents provided a variety of examples in terms of unintended consequences, non-IA costs, benefits and other comments in respect of EMF 2016, the top response was 'no', 'none' and 'not applicable'. It is worth noting, however, that a number of respondents indicated that there had been benefits from EMF 2016, with examples including: increased awareness of the risks of EMFs for workers; the legislation providing reassurance to staff around EMF safety; and greater regulatory clarity.
- The predictive estimates from the EMF 2016 impact assessment (IA) were updated with observed figures, leading to an increase in the equivalent annual net cost (EANCB) of EMF 2016 to £6.0 million from the original 2016 estimate of £1.66 million<sup>2</sup>. (Please note: detailed figures are provided in the separate Cost Benefit Analysis [CBA] document at Annex 2)
- Respondents felt that the EMF 2016 objectives could not be achieved with a system that imposed less regulation and indicated that EMF 2016 was still needed.

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<sup>2</sup> Please note that the original EMF 2016 impact assessment ([https://www.legislation.gov.uk/ukia/2016/129/pdfs/ukia\\_20160129\\_en.pdf](https://www.legislation.gov.uk/ukia/2016/129/pdfs/ukia_20160129_en.pdf)) uses the £1.66 million figure and EANCB terminology; in the revised CBA accompanying the PIR these are replaced by £1.7 million figure and EANDCB terminology.

- Following the UK's departure from the EU, HSE assessed that it would be inappropriate to approach EU member states in order to gather information about how they had implemented the EMF regulations.

## Introduction

1. This Evidence Review has been undertaken by the Health and Safety Executive (HSE) to accompany and support the Post-Implementation Review (PIR) of The Control of Electromagnetic Fields at Work Regulations 2016 (SI 2016/588) ('EMF 2016').
2. The Electromagnetic Fields at Work Regulations 2016 (EMF 2016) came into force on 1st July 2016. The regulations deal with the safe use of electromagnetic field radiation, which is a type of non-ionising radiation that occurs naturally in the environment. Electromagnetic fields (EMFs) are created whenever electrical energy is used and are present in virtually all workplaces. There are, however, some EMFs which are strong enough to present a risk in some workplaces. Exposure to high levels of EMFs can give rise to effects that may be irritating or unpleasant, or sometimes harmful causing burns. EMF 2016 provides the minimum health and safety requirements regarding the exposure of workers to the risk arising from EMFs and requires employers to assess the levels of EMFs their workers are exposed to against specific sets of exposure levels.
3. EMF 2016 transposed the European Physical Agents (Electromagnetic Fields) Directive 2013/35/EU. It was intended to ensure that:
  - there is a harmonised regime across all European member states;
  - dutyholders take action to minimise and control the risks from EMFs; and
  - all workers remain protected.
4. The PIR, and the corresponding report, must meet the legislative requirements set out in regulation 15 of EMF 2016 to carry out a review of regulations and publish a report within five years of the regulations coming into force (so, by the 30<sup>th</sup> June 2021). Regulation 15(3) specifies that the PIR report must:
  - (a) set out the objectives intended to be achieved by the Directive and these regulations;
  - (b) assess the extent to which those objectives are achieved (*e.g. has EMF 2016 achieved what it originally set out to?*); and
  - (c) assess whether those objectives remain appropriate and, if so, the extent to which they could be achieved with a system that imposes less regulation (*e.g. are the EMF regulations needed? Is EMF 2016 still the most appropriate approach?*).
5. As background, the first EMF Directive was adopted in 2004. However, following adoption the manufacturing sector, in particular the automotive sector, as well as magnetic resonance imaging (MRI) operators<sup>3</sup>, raised concerns that it contained disproportionate requirements and was overly burdensome. The obligations in the 2004 Directive never came into effect, as it was decided it should be repealed and replaced by Directive 2013/35/EU (Physical Agents (Electromagnetic Fields)) to enable more

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<sup>3</sup> MRI is widely used in medical diagnostics.

appropriate and proportionate measures to be introduced to protect workers from the risks associated with electromagnetic fields.

6. As part of the PIR planning process, HSE’s Regulation Committee assessed the EMF 2016 PIR in terms of its scope and scale. ‘Scope’ refers to whether the PIR needs to look at the impact of the specific legislative changes or, alternatively, whether it should consider the appropriateness of the overarching legislative framework in which the changes sit. Alongside this, ‘scale’ considers the wider importance of the PIR in terms of its political visibility, predicted economic impact, number of duty-holders it affects, etc. and therefore the level of resource which is required (high, medium or low). In the case of the EMF 2016, the policy objective was to implement a proportionate set of regulations that transpose parts of the Directive not covered by existing legislation. Therefore, scope refers to EMF 2016 in its entirety. The scale was considered ‘low’, due to the following reasons:
  - The Equivalent Annual Net Direct Costs to Business (EANCB) from the original impact assessment (IA) for The Control of Electromagnetic Fields at Work Regulations 2016 (IA No: HSE 0093) was £1.66 million in 2014 prices<sup>4</sup>. This is well below the £5 million *de minimis* threshold required by the Regulatory Policy Committee (RPC)<sup>5</sup>;
  - EMF 2016 was largely non-contentious: only 48 responded to the consultation with 83% of respondents supporting the proposed transposition approach; and
  - EMF 2016 did not impose significant additional burdens on duty-holders.
7. While HSE’s Regulation Committee determined scope and scale, HSE’s Evaluation Governance Group (EGG) considered whether the proposed research approach was proportionate and sensible. To this end, EGG assessed whether the suggested data collection methods were appropriate to get the required evidence, but not so onerous as to place an undue burden on duty-holders. The EGG agreed that the proposed research approach lent itself to a low-level, or ‘light-touch’ PIR.
8. To answer the specific questions within Regulation 15, and to ensure a suitably proportionate approach was used, a light-touch quantitative research approach was employed to collect primary evidence. This consisted of an on-line survey being sent to a mixed group of stakeholders consisting of individuals who had helped in the original negotiation around the EMF European Union (EU) Directive, people who had responded to the original EMF consultation, specific trade associations and an online community interested in EMF; in total the survey went directly to approximately 700 contacts. Subsequently, in order to expand and clarify some of this evidence –

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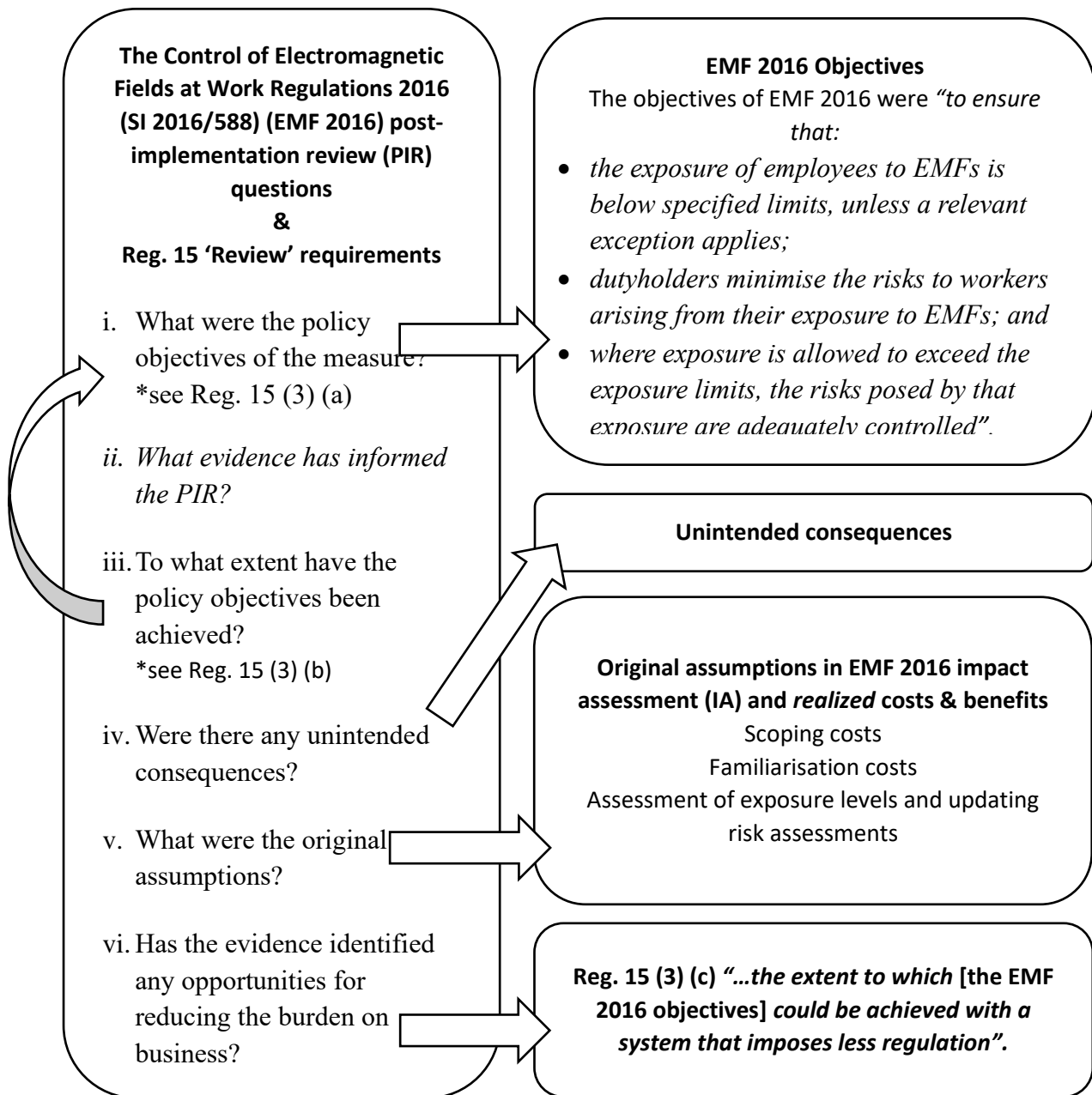
<sup>4</sup> The Control of Electromagnetic Fields at Work Regulations 2016 Impact Assessment (IA No: HSE0093) ([https://www.legislation.gov.uk/ukia/2016/129/pdfs/ukia\\_20160129\\_en.pdf](https://www.legislation.gov.uk/ukia/2016/129/pdfs/ukia_20160129_en.pdf))

<sup>5</sup> <https://www.gov.uk/government/organisations/regulatory-policy-committee>

specifically around businesses with less than five employees and welding businesses – the survey was promoted and re-distributed by two welding trade associations.

9. The structure of the Evidence Review is detailed in Diagram 1 (below), with the numbered sections directly mapping onto headings within the main document (e.g. '*i. What were the policy objectives ...*' in the diagram equates to the '*i. What were the policy objectives ...*' headed section in the main document).

Diagram 1: Structure of EMF 2016 PIR evidence review



10. EMF 2016 came into force on 1<sup>st</sup> July 2016. The Regulations include only those elements of the Directive that are more prescriptive than exist in current health and safety legislation, namely the Health and Safety at Work Act etc. 1974 and the Management of Health and Safety at Work Regulations 1999 ('Management Regulations 1999').

#### Summary of EMF 2016

EMF 2016 includes aspects that mirror requirements in the Management Regulations 1999, but refer specifically to EMFs, whereas the Management Regulations cover all risks, which includes EMFs. Therefore, these are actions that are not new to employers:

- Assessing and controlling the risks in the workplace;
- Provision of suitable controls, which includes measures such as choice of equipment, technical and/or organisational measures, signage and limiting access to areas where appropriate, maintenance of equipment and design of workplaces, and availability of adequate personal protective equipment;
- Consideration of workers at particular risk
- Provision of information and training for workers
- Provision of medical examinations and/or health surveillance where appropriate

The new actions required of employers are to:

- Assess the levels of EMFs to which workers may be exposed against a set of specific values, called Exposure Limit Values (ELVs)
- Ensure that exposure does not exceed these ELVs. However, the sensory effects ELVs may be exceeded where certain conditions are met (sensory effects include nausea and vertigo for example in contrast to health effects, which include shocks and heating) HSE can exempt duty holders from the exposure limits in relation to specific work activities.

#### Post-Implementation Review (PIR) questions

1. The PIR considers EMF 2016 in terms of the following questions:
  - i. **What were the policy objectives of the measure?**
  - ii. **What evidence has informed the PIR?**
  - iii. **To what extent have the policy objectives been achieved?**
  - iv. **What were the original assumptions?**
  - v. **Were there any unintended consequences?**
  - vi. **Has the evidence identified any opportunities for reducing the burden on business?**
  - vii. **For EU measures, how does the UK's implementation compare with that in other EU member states in terms of costs to business?**



***i. What were the policy objectives of the measure?***

11. The objectives of the EMF 2016 as set out in the regulation’s Explanatory Memorandum, were “to ensure that:

- *the exposure of employees to EMFs is below specified limits, unless a relevant exception applies;*
- *dutyholders minimise the risks to workers arising from their exposure to EMFs; and*
- *where exposure is allowed to exceed the exposure limits, the risks posed by that exposure are adequately controlled”.*<sup>6</sup>

As to whether the policy objectives and intended effects of EMF 2016 have been achieved, this will be covered below in section ‘iii. To what extent have the policy objectives been achieved?’.

***ii. What evidence has informed the PIR?***

12. The evidence which has informed the EMF 2016 PIR is detailed in this document, the ‘Evidence Review’.

13. In order to capture views of stakeholders on EMF 2016, a survey was developed using the online survey tool SurveyMonkey<sup>7</sup>. The questions were hosted online, with a web-link generated which was sent out to stakeholders. In addition, a link to the survey was posted onto HSE’s ‘Radiation’ community site, with a notification being sent to all members. The survey asked questions about respondents’ general experience of the EMF 2016 regulations as well as specific examples of costs and benefits experienced (e.g. areas identified within the original impact assessment [IA]<sup>8</sup>).

14. The survey web-link was sent out to the following groups of contacts on Thursday 12th November 2020 with a deadline for replies by Wednesday 2nd December 2020. (Blank copies of the survey can be found at Appendix A):

<b>Group name</b>	<b>No. of contacts</b>	<b>Comments</b>
EMF Industry Working Group (IWG)	17	This group was set-up in the summer of 2013 following the end of the of the extended negotiation period and adoption of the Directive 2013/35/EU <sup>9</sup> .
Respondents to the EMF	45	The consultation on the implementation of Directive 2013/35/EU concluded on 3 <sup>rd</sup> December 2015.

<sup>6</sup> Paragraph 7.2, page 2 - [https://www.legislation.gov.uk/ukxi/2016/588/pdfs/ukxiem\\_20160588\\_en.pdf](https://www.legislation.gov.uk/ukxi/2016/588/pdfs/ukxiem_20160588_en.pdf)

<sup>7</sup> <https://www.surveymonkey.co.uk/>

<sup>8</sup> *Ibid* 3

<sup>9</sup> Paragraph 14, page 7 -

<https://webarchive.nationalarchives.gov.uk/20160713142058/http://consultations.hse.gov.uk/qf2.ti/f/21378/591941.1/PDF/-/CD276.pdf>

Group name	No. of contacts	Comments
consultation in 2015		
Missing trade associations / groups	2	While most sectors identified in the impact assessment as being in scope of the new EMF regulations were covered within the list of contacts detailed above, there were several gaps. In particular, the rail and plastics manufacturing sectors were absent and were contacted separately.
Members of HSE's online radiation Community of Interest (CoI)	647*	Alongside the IWG being constituted in 2013 (see above), HSE also set-up and facilitated an EMF online community of interest (CoI) so anyone interested in the transposition of the Directive had the opportunity to provide input <sup>10</sup> . This CoI is still active and now covers all radiation matters, not just EMFs. As such, a link to the survey, with a covering explanation, was posted on the forum and CoI members were alerted. <i>*While all members of the CoI would have been aware of the survey, they would not have received a direct survey link (unlike the other stakeholders detailed above).</i>

15. The sectors represented via the sample groups detailed above include:

- Automotive
- Energy
- Health
- Metals and manufacturing
- Ministry of Defence
- Plastics
- The railway industry
- Small and medium enterprises
- Telecommunications and broadcasting
- The magnetic resonance imaging (MRI) community
- Other sectors whose activities may be affected by EMFs e.g. induction heating furnaces

16. Some stakeholders have been involved in the development of the EMF regulations since the original negotiation period (2002-2013), and the above detailed sample includes over 80 companies, as well as trade associations, regulators and government departments.

17. In the original impact assessment<sup>11</sup> (IA) the assumptions made in respect of the number of businesses affected per sector were:

<sup>10</sup> *Ibid* 3, paragraph 37, page 11

<sup>11</sup> *Ibid* 3, paragraph 77, page 18 -

<b>Business sector</b>	<b>Estimated number of businesses affected by EMF 2016</b>
Telecommunications and broadcasting	11,500 businesses
Health	244 NHS Trusts in England, 3 in Wales and 14 in Scotland plus approximately 200 private hospitals in Great Britain (GB).
MRI sector	500 MRI units in GB; 148 MRI machines in use by research facilities
Energy	6,200 businesses
Welding	60,000 businesses
Plastics	5,600 businesses
MOD	Viewed as just one entity
Rail Industry	4,000 businesses
<b>Total</b>	<b>88,410</b>

18. In total, there were 139 full or partial responses to the survey. There were, however, low response numbers for: welders (the main group identified as being impacted by the EMF changes, above); and those indicating how long it took to undertake an EMF exposure assessment and update the necessary risk assessment(s) who had fewer than 5 employees. As such, the survey was re-issued (with a deadline of Weds 24th February 2021), with HSE purchasing a small advertorial in ‘Welding World’ trade magazine<sup>12</sup> promoting the EMF 2016 PIR survey. In addition, details of the survey were sent to the approximately 68,000 contacts on the ‘Welding World’ mailing list. Alongside this, The Welding Institute (TWI)<sup>13</sup> sent out an e-mail to their members promoting the survey. Promotion via Welding World and TWI subsequently generated 17 additional responses. As such, in total, there were 156 full or partial responses to the survey which were subsequently used for the following analysis.

19. Further details of the online survey are provided below in terms of the demographics of respondents (main focus of business; number of people working in organisation; person who implemented EMF 2016 in organisation):

<sup>12</sup> <https://www.welding-world.com/>

<sup>13</sup> <https://www.theweldinginstitute.com/>

What is the main focus of your business / your employer's business?		Number of responses																																										
Other (See below for further details):		42 (27%)																																										
Did not answer		39 (25%)																																										
Welding		14 (9%)																																										
Health – other		14 (9%)																																										
Ministry of Defence (MOD)		13 (8%)																																										
Telecommunications & broadcasting		12 (8%)																																										
Rail industry		9 (6%)																																										
Health – magnetic resonance imaging (MRI)		7 (4%)																																										
Energy		5 (3%)																																										
Plastics		1 (1%)																																										
<b>Total</b>		<b>156</b>																																										
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How many people work in your organisation?	No. of responses
Only me (self-employed)	6 (4%)
1 – 4 employees	1 (1%)
5 – 9 employees	2 (1%)
10 – 24 employees	11 (7%)
25 – 49 employees	11 (7%)
50 – 99 employees	6 (4%)
100 – 249 employees	8 (5%)
250 – 499 employees	8 (5%)
500 – 999 employees	5 (4%)
1000+ employees	57 (36%)
Unsure / don't know	1 (1%)
Did not answer	40 (26%)
<b>Total</b>	<b>156</b>

20. Reflecting on the respondents’ demographics, the re-issuing of the survey has meant that welders have moved from being under-represented to subsequently being the largest identifiable occupation grouping. This grouping, however, still only accounts for nearly one in ten respondents (9%), with over a quarter of respondents (27%) indicating they work within an ‘other’ type of organisation. (Many respondents – about a quarter (25%) – also did not answer this question). As for the size of the respondents’ businesses, over a third (36%) indicated that they worked for an organisation with over 1,000 employees. This was by far the largest grouping of respondents and suggests that the data may over-represent large businesses and under-represent small businesses. While the risks faced by both small and large employers are likely to be similar, larger businesses will have greater capability and capacity to both understand and deal with the relative complexity of EMF risks. Sadly, it is not possible to explore this view in greater depth as a quarter (25%) of respondents did not provide information about the size of their business. Where the figures *suggest* such a conclusion, however, it will be mentioned and highlighted in the analysis. is not

**iii. To what extent have the policy objectives been achieved?**

- 21. In order to capture whether the policy objectives and intended outcomes for EMF 2016 have been achieved, each objective detailed in section ‘i. What were the policy objectives of the measure?’ (above) will be considered alongside any evidence either supporting or challenging it.
- 22. EMF 2016 came into force by the deadline set by the European Commission and so the objective of following Government policy and transposing the Directive in line with Treaty obligations was met.
- 23. The other objectives of ensuring control and worker protection whilst minimising burdens are discussed in the sections below under the general headings of the intended effects of EMF 2016.

**EMF 2016 ensures that ‘the exposure of employees to EMFs is below specified limits, unless a relevant exception applies’**

24. An objective of EMF 2016 is to ensure workers are protected through assessing and controlling exposure to EMFs. Respondents were asked to indicate how strongly they agree or disagree with the statement: “EMF 2016 ensures that the exposure of employees to EMFs is below specified limits (unless a relevant exception applies)”.

No. of respondents	Evidence
n = 156 (full or partial responses to survey)	All respondents answered this question (so 156 responses), with nearly half (47%, 73) agreeing with the statement and a further one in five (19%, 30) strongly agreeing. A further one in six (13%, 21) neither agreed nor disagreed, leaving only one in ten (10%, 16) disagreeing and only two people (1%) strongly disagreeing. The remaining one in ten (9%, 14) said they did not know.

25. Two-thirds of respondents (66%, 103) agreed with the statement, indicating that they felt that the EMF 2016 regulations had ensured that exposure of employees to EMFs were below specified limits, in contrast to only about one in ten (11%, 18) who disagreed.
26. Respondents who indicated that they disagreed with the statement that EMF 2016 ensured that employees' exposure to EMFs was below specified limits were subsequently asked to explain why they disagreed. Of the 18 people who either disagreed or strongly disagreed, the vast majority – nine in ten (94%, 17) - provided further details. This information was subsequently analysed and produced the following themes:

<b>Primary theme<sup>14</sup></b>	<b>No. of responses</b>
Legislation can't limit exposure	7 (41%)
Lack of awareness	4 (23%)
Employers don't assess exposures	1 (6%)
Inadequate HSE enforcement	1 (6%)
Not industry specific	1 (6%)
Other regulations already control risk	1 (6%)
Overly complex/unclear legislation	1 (6%)
Unclear	1 (6%)
<b>Total</b>	<b>17</b>
<b>Secondary theme</b>	<b>No. of responses</b>
Regulations too vague	7 (70%)
Employers ignore regulations	1 (10%)
Limits too low	1 (10%)
Regulations too complex	1 (10%)
<b>Total</b>	<b>10</b>

27. Four in ten (41%, 7) of those who disagreed with the statement suggested that simply imposing legislation cannot, in itself, limit workers' exposure to EMFs. A further quarter (23%, 4) of respondents claimed that there is either a lack of awareness of the regulations, a lack of understanding of EMFs, or a combination of these two factors. The most prevalent secondary theme raised by seven in ten (70%, 7) of those who provided this information was that the regulations themselves are not specific enough about exposure limits or cannot be implemented because they are unclear to duty-holders. Quotes about these themes include:

*“EMF 2016 can't 'ensure' exposure is below specified limits...”*

*“Limits are not specified in the regulations so measurements cannot be compared...”*

*“Lack of awareness and understanding means that it has largely been ignored except for high EMF applications which were probably already well managed”*

**EMF 2016 ensures that 'dutyholders minimise the risks to workers arising from their exposure to EMFs'**

<sup>14</sup> Where respondents have provided more than one theme in a single answer (e.g. regulations can't limit exposure and they are too vague) each theme has been recorded separately. The theme which appears to be the main point, often coming first in the response, is thereby recorded as being 'primary' and subsequent views are captured under the 'secondary' theme heading.

28. The survey also asked people to consider the following statement and detail how strongly they agreed or disagreed with it: “EMF 2016 ensures that businesses minimise the risks to workers from exposure to EMFs”.

No. of respondents	Evidence
n = 156 (full or partial responses to survey)	In total, about nine in ten (91%, 142) of the 156 respondents answered this question. Of these over six in ten (61%, 86) agreed or strongly agreed with the statement. (Nearly one in five [18%, 26] strongly agreed). On the other end of the scale, one in six (16%, 23) felt that EMF 2016 had not minimised risks from EMF to workers and disagreed with the statement. (Although only two people [1%] strongly disagreed). Of the remaining responses, one in six (18%, 25) did not have a strong opinion either way and six per cent (8) simply did not know.

29. The majority of respondents to this question – six in ten (61%, 86) - felt that EMF 2016 had met its ‘second’ objective and ensured ‘that businesses minimise the risks to workers from exposure to EMFs’. (Just under one in five [18%, 25] disagreed).
30. Of the 25 people who disagreed or strongly disagree with the statement, eight in ten (80%, 20) provided more detailed feedback along the following themes:

Primary theme	No. of responses
Risks not understood	5 (25%)
Regulations not understood	4 (20%)
Existing regulation controls risk	2 (10%)
Lack of enforcement	2 (10%)
Burden of regulation disproportionate to risk	2 (10%)
Compliance assured by external consultants and equipment producers	1 (5%)
Compliance difficult	1 (5%)
Directive not industry specific	1 (5%)
Employers unaware of regulations	1 (5%)
Legislation too vague	1 (5%)
<b>Total</b>	<b>20</b>

31. A quarter of responses (25%, 5) indicated that the EMF 2016 regulations do not ensure that businesses minimise the risks of exposure to workers because employers simply do not understand the risks posed to workers by EMFs. A further one in five (20%, 4) people asserted that duty-holders also do not understand the 2016 regulations themselves. The rules are seen as too complex or obscure for duty-holders to interpret and implement practically. In terms of a sector perspective, there were not any clear patterns, although one in five (20%, 4) comments came from the health sector. When organisations’ responses were considered by their size, approximately one in six (15%, 3) employed more than a thousand workers and commented that the risks of EMFs are not fully understood. Some of the comments which were provided include:

*“Most businesses will not understand the risk from exposure to EMF”*

*“Most employers are unaware of the regulations...”*

**EMF 2016 ensures that ‘where exposure is allowed to exceed the exposure limits, the risks posed by that exposure are adequately controlled’**

32. Exposures may exceed exposure limits but there is an expectation the associated risks are considered and minimised as part of risk control and associated protections. The survey asks respondents to agree, disagree or provide a neutral response to a statement with the option of indicating that they ‘don’t know / unsure’ or simply can refuse to answer the question (which some do). The statement was: “*EMF 2016 ensures that where EMF exposure is above the limits the risks are controlled*”.

No. of respondents	Evidence
n = 156 (full or partial responses to survey)	This question again had a good overall response rate with 133 of the 156 respondents (or 85%) providing an answer. Paralleling people’s views on the other objectives, the majority once again agreed with the statement (61%, 81) with only about one in six (18%, 24) disagreeing. A similar number were neutral about the statement (17%, 23). Only 5 people indicated that they did not know or were unsure.

33. The ‘final’ EMF 2016 objective – about ensuring that where EMF exposures are above the limits, the risks are suitably controlled – was deemed to have been met by over six in ten (61%, 81) respondents, a majority once again.

34. Of the one in six (18%, 24) respondents who disagreed with the statement, a variety of reasons were given by the nine in ten (92%, 22) who provided further detail about why they felt that ‘above the limit’ EMF risks were not controlled, including:

Primary theme	No. of responses
Additional burden on business	4 (18%)
Regulations too complex	3 (14%)
Regulations too vague	3 (14%)
Inadequate awareness of regulations	3 (14%)
Risks not understood	2 (9%)
Limits too onerous	2 (9%)
Measures already in place	2 (9%)
Responsibility lies with employer	1 (4%)
External sources beyond employers' control	1 (4%)
Scope of regulations insufficient	1 (4%)
<b>Total</b>	<b>22</b>

35. Interestingly, the one in six (18%, 4) people who disagreed that the objective had been achieved highlighted the additional burden on business the regulations had imposed; this reflected a concern of HSE when the EU Directive was being originally negotiated and implemented. Issues which are likely to be driving this additional burden on business are the fact that the regulations are too complex (14%, 3) and too vague (14%, 3). Respondents indicated that:

*“... The regulations make clear statements of what is required, but too complex for business to understand how to comply.”*



*“... this legislation appears to be a sledgehammer to crack a nut at least in the NDT [non-destructive testing] field.”*

*“It's too vague when giving requirements about what to do if exposures are above the limits.”*

36. Overall, most respondents agree that the EMF 2016 objectives and its intended effects as detailed in the Explanatory Memorandum have been achieved. Across the three objectives approximately two-thirds of respondents (66%, 61%, 61% respectively) agreed with the statements about the achievement of the objectives. Where there has been disagreement with the objectives, it has been relatively minor ranging from 11 per cent to 18 per cent of responses. Comments from those who disagreed appear to be around the interpretation that the regulations are too vague and complex, and there is a general lack of awareness and understanding about the EMF risk and the regulations themselves. All these factors consequently make it difficult for business to efficiently engage with EMF 2016. As these appear to be communication issues, one possible solution is for HSE to provide better information and more focused, targeted guidance, which could be a particular focus of the next PIR.

**iv. Were there any unintended consequences?**

37. Outside of assessing whether the EMF 2016 regulations have achieved their objectives and what the ‘actuals’ are in terms of costs (against the estimates in the original IA), the PIR also asks about miscellaneous impacts such as non-IA identified costs, other benefits and general comments and observations about EMF 2016. These non-defined impacts are summarised here alongside whether EMF 2016 has had any unintended consequences.

**Unintended consequences**

38. To this end, respondents to the online survey were asked whether there had been ‘any unintended consequences due to the EMF 2016 changes’ and provided with a ‘free-text’ box in which to provide their thoughts.

39. Out of the 156 respondents to the survey, almost half (46%, 72) provided some sort of comment about the unintended consequences of the EMF 2016 regulations, even if it was only to indicate they did not think there were any. Of these 72 responses, 64 (89%) were substantive and indicated the following:

<b>Any unintended consequences due to the EMF 2016 changes?</b>	<b>No. of responses</b>
None	30 (48%)
Greater risk awareness	5 (8%)
Modification/replacement of equipment	4 (6%)
Military exceptions	2 (3%)
Potential loss of NDT inspection	2 (3%)
Procedure change	2 (3%)
Public concern	2 (3%)
Risk exaggerated	2 (3%)
Time	2 (3%)
Unknown	2 (3%)

<b>Any unintended consequences due to the EMF 2016 changes?</b>	<b>No. of responses</b>
Better administrative controls	1 (1%)
Improved equipment management	1 (1%)
Increased bureaucracy	1 (1%)
Minimal impact	1 (1%)
Poor enforcement	1 (1%)
Production disrupted	1 (1%)
Regulatory conflict	1 (1%)
Responsibilities unclear	1 (1%)
Unclear	1 (1%)
Unnecessary expense	1 (1%)
Additional assessments	1 (1%)
<b>Total</b>	<b>64</b>

40. Of the 64 substantive comments, nearly half (47%, 30) of those responding reported that they had experienced ‘no / none’ unintended consequences. Outside of indicating that there were no unintended consequences the only other issues which were mentioned multiple times were the increase in risk awareness around EMF (8%, 5) and the need to replace equipment (6%, 4). For example, some of the comments made were:

*“Better informed staff, more engaged H&S team”*

*“Mass modification/replacement of MPI [magnetic particle inspection] equipment would be required, equipment suppliers appear to have no interest in achieving compliance even with new equipment”*

41. While the former of these comments is hugely encouraging and is arguably what HSE is working towards in its EMF work, the latter point is a disappointing outcome of HSE’s drive to improve safety standards. Also, all the comments about the greater awareness of the risks presented by EMFs came from people working in large employers (more than 1000+ employees), with a couple from the health MRI sector, so are likely to already be ‘doing the right thing’. As for the replacement of equipment point, a number of MoD employees mentioned this, so it may be a particular issue in that sector (although the low response number makes it difficult to come to any firm conclusion. ).

42. As for whether the general tenor of the unintended consequences were positive or negative, when all the substantive responses (65) were considered, over half (55%, 36) were neutral, about a third were negative (35%, 23) and only one in ten (9%, 6) were positive.

<b>Overall the unintended consequences identified were:</b>	<b>No. of responses</b>
Neutral	35 (55%)
Negative	23 (36%)
Positive	6 (9%)
<b>Total</b>	<b>64</b>

***Any other costs as part of the EMF 2016 changes***

43. Respondents were also asked “*have there been any other costs as part of the EMF 2016 changes?*”. Out of the 156 people who responded (either fully or partially) to the survey, 74 (47%) provided a response of some description to this question.

<b>Any other costs as part of the EMF 2016 changes</b>	<b>Count of main theme</b>
Not applicable (N/A)	22 (30%)
Staff training	10 (13%)
External contractor	8 (11%)
Time	8 (11%)
New equipment	6 (8%)
Signage	3 (4%)
Unknown	3 (4%)
Health monitoring	3 (4%)
Unclear	2 (3%)
New documentation	2 (3%)
Measurements	1 (1%)
Guidance note	1 (1%)
Research	1 (1%)
Review policy	1 (1%)
Risk assessment	1 (1%)
Modelling analysis	1 (1%)
Additional shielding	1 (1%)
<b>Total</b>	<b>74</b>

44. Nearly a third of people (30%, 22) who provided some sort of response to this question either indicated ‘no’ or did not provide a suitable answer. Of those who did provide an answer, just over one in ten (13%, 10) said that training was a cost of EMF 2016 which was not covered within the original impact assessment. Furthermore, approximately one in ten respondents said that they had to engage an external contractor to help with EMF 2016 (11%, 8) and had to put aside additional time to implement the regulations (11%, 8). It should be noted that training, use of an external contractors and putting aside additional time to implement the regulations are things which businesses would be required to do under other general health and safety law and are not specific additional requirements of EMF 2016. Examples of the comments made include:

*“Additional induction training for new employees and suppliers of EMF type equipment”*

*“For known high risk areas, we have brought in a specialist to assist.”*

*“Employee time for training purposes - which was unnecessary.”*

45. Of those businesses that indicated that training was an additional cost, seven in ten (70%, 7) employed more than a thousand people. The size of the business may reflect these additional costs, especially if the business in question operates with a lot of EMF-emitting equipment. Employers of this size also submitted two-thirds (63%, 5) of the

responses asserting that the regulations had incurred additional time costs, with three of the five responses being from the Ministry of Defence (MoD). Outside of the MoD, the sectors that provided a higher number of responses to this question included manufacturing and the health (non-MRI) sectors; there was not, however, any discernible patterns to these responses.

**Any benefits as part of the EMF 2016 changes**

46. On the flipside of costs, the survey also asked about benefits related to EMF 2016: “[h]ave there been any benefits as part of the EMF 2016 changes?”. The response rate was broadly similar to that of the ‘additional costs’ question, with nearly half of the 156 respondents (48%, 75) providing responses.

Any benefits as part of the EMF 2016 changes	Count of main theme
Increased EMF risk awareness	23 (31%)
No	23 (31%)
Staff safety & reassurance	13 (17%)
Greater regulatory clarity	7 (9%)
Compliance proven	3 (4%)
Unknown	2 (3%)
Improved controls	2 (3%)
Better equipment maintenance	1 (1%)
Yes	1 (1%)
<b>Total</b>	<b>75</b>

47. It is hugely positive to note that nearly a third of respondents (31%, 23) indicated that the EMF 2016 changes led to a general raising of awareness about the risks and dangers of EMF. Interestingly a number of comments mentioned the risk presented to people with medical implants or that EMFs are now routinely considered as part of their safety processes. Alongside awareness, the reassurance provided by the EMF 2016 changes (17%, 13) is further good news. Some of the comments included:

*“Attention drawn to workers at particular risk, medical implants. Attention drawn in general to EMF hazards across all industries, particularly telecoms site landlords.”*

*“One x individual with a pacemaker fitted is now better informed. He knew of the risk prior to EMF 2016.”*

*“Confidence in safety of staff and patients.”*

48. As with additional costs, the largest proportion of responses to this question came from organisations employing over a thousand people, with nearly four in ten (38%, 9) talking about increased EMF risk awareness and a third (33%, 8) indicating that the change in regulations had improved staff safety and reassurance. There was a little more variation in responses to this question in terms of industrial sector; four

consultants (5%) expressed the view that the regulations had increased awareness of the risks presented by EMFs, as did three respondents (4%) from the health (non-MRI) sector. A further three health (non-MRI) respondents (4%) asserted that the regulations had improved staff safety and reassurance.

**Any further observations or comments about EMF 2016**

49. The survey concluded by asking respondents if they had anything further they wanted to mention in terms of EMF 2016. Of the 156 people who started the survey, only about a quarter (28%, 44) provided further information and feedback to the question “[i]f you have any further observations or comments about EMF 2016, please briefly detail these below”.

Further observations or comments about EMF 2016	Count of main themes
None	7 (16%)
Guidance needed	6 (14%)
EMF 2016 should remain	5 (11%)
Further clarification of risk required	5 (11%)
More sector specificity	3 (7%)
Additional burden	3 (7%)
Unclear	3 (7%)
Improves worker safety	2 (5%)
Pre-existing controls	2 (5%)
Unaware of regulations	2 (5%)
Exemption for military SAR testing	1 (2%)
Extra expense	1 (2%)
Disproportionate to risk	1 (2%)
Lack of enforcement	1 (2%)
Lack of expertise	1 (2%)
Risk awareness raised	1 (2%)
<b>Total</b>	<b>44</b>

50. In terms of the responses, where substantive comments were made, about one in six people (14%, 6) indicated that more guidance is needed in interpreting the regulations, applying them in practice, and in carrying out risk assessments and equipment checks. As there is already guidance in interpreting and applying the EMF 2016 regulations, respondents are probably talking about ‘better’ guidance rather than just increasing the amount of guidance. A further one in ten respondents (11%, 5) commented that the risks presented by EMFs (also by low-powered and ‘pulsed’ EMFs) need to be clarified, as do the kind of people at highest medical risk, in order to help them inform and protect workers. Another one in ten respondents (11%, 5) used the opportunity to make additional comment in order to present arguments for the retention of the EMF 2016 regulations.



<b>Summary of costs as estimated in the 2016 IA (£ millions, 2015 prices, present value base year 2016)</b>		
	<b>Net Present Value (NPV) over 10 years<sup>17</sup></b>	<b>Equivalent annual costs<sup>18</sup></b>
i. Scoping costs (one-off)	3.7	0.4
ii. Familiarisation (one-off and ongoing)	7.8	0.9
iii. Exposure and Risk assessment (one-off and ongoing)	3.5	0.4
<b>Total<sup>19</sup></b>	<b>15</b>	<b>1.7</b>

57. The costs detailed in the original IA were based on the following assumptions in respect of each category of impact:

<sup>17</sup> Net present value is the sum of discounted costs over the 10-year appraisal period

<sup>18</sup> The equivalent annual cost is the constant annual cost over the appraisal period which gives the same net present value as is calculated using actual costs. This provides a common metric to compare costs from different interventions with different lengths of appraisal period. The costs to the public sector in the 2016 IA do not affect these rounded figures, being so small, and so these figures also represent the Equivalent Annual Net Direct Cost to Business (EANDCB). The 2016 IA estimated its final EANDCB figure in 2014 prices and 2015 present value for the purposes of the Business Impact Target. We present it here in 2015 prices, 2016 present value for simplicity. This change does not affect the rounded total EANDCB figure of £1.7m.

<sup>19</sup> Components may not appear to sum to total due to rounding

Assumptions	Time	Full economic cost of workers' time per hour (£) <sup>20</sup>	The estimated number of businesses affected by EMF 2016 <sup>21</sup>
Scoping costs <sup>22</sup>	10 minutes	£25.80	88,000 (no. of businesses in <i>identified sectors</i> – telecommunications and broadcasting, health, MRI sector, energy, welding, plastics, MOD and rail industry).  785,000 (no. of businesses which use equipment which would give rise to uncertainty)
Familiarisation <sup>23</sup>	1 hour	£25.80	18,000 (sectors where EMFs are significant risk <sup>24</sup> - telecommunications and broadcasting sector, MRI, and energy)
	2 hours	£25.80	70,000 (sectors where EMFs are not a significant risk <sup>25</sup> - health sector, welding, plastics, the MOD and the rail sector)
	1 hour	£25.80	2,300 (new businesses per year in significant risk sectors)
	2 hours	£25.80	8,600 (new businesses per year in non-significant risk sectors)
Assessing exposure and updating risk assessments <sup>26</sup>	1 hour	£25.80	8,900 (businesses in identified sectors [see above] with 5 or more employees)
	30 minutes	£25.80	78,000 (businesses in identified sectors [see above] with fewer than 5 employees)
	1 hour	£25.80	1,000 (new businesses per year in identified sectors with 5 or more employees)
	30 minutes	£25.80	9,700 (new businesses per year in identified sectors with fewer than 5 employees)
	1 hour	£25.80	889 (businesses with 5 or more employees <u>replacing equipment per year</u> )
	30 minutes	£25.80	7,800 (business with fewer than 5 employees <u>replacing equipment per year</u> )



56. In addition, the original IA estimates a cost per hour based on someone’s time to undertake the above activities – e.g. scoping and becoming familiar with the new regulations and assessing the risk. To do this it uses wage information from the Annual Survey of Hours and Earnings (ASHE, 2015 provisional) to estimate “*the average of the mean gross hourly wage rate for the occupation ‘health and safety officer’ and the mean gross hourly wage rate for the occupation ‘managers, directors and senior officials,’ and uprating by 19.8% to include non-wage costs, the full economic cost of workers’ time used in the analysis is £25.80*”<sup>27</sup>.

57. The online survey detailed in ‘ii. What evidence has informed the PIR?’ section looked to collect *actual* data on who implemented the EMF 2016 changes as well as against each of the headings in the above table.

**Who implemented the EMF 2016 changes?**

58. In order to capture who in the business was responsible for implementing the EMF 2016 changes the following question was asked: “*Who in your organisation implemented the EMF 2016 regulations?*”. The options provided were: ‘Manager, director and/or senior official’; ‘Health and Safety Officer’; ‘MRI safety advisor (for MRI sector only)’; and ‘Unsure / don't know’. Of those who selected ‘Manager, director and/or senior official’ a subsequent question asked whether their position was ‘Health & Safety Manager / Health & Safety Director’ or ‘Other’. The below table reflects the responses from the 156 full or partial replies received.

Position of person who implemented EMF 2016 regulations	No. of responses	What is/was their position?	No. of responses
Manager, director and/or senior official	28 (18%)	Health & Safety Manager / Health & Safety Director	11 (39%)
		Other	17 (61%)
Health and Safety Officer	30 (19%)		
MRI safety advisor (for MRI sector only)	5 (3%)		
Unsure / don't know	15 (10%)		
Did not answer	52 (33%)		

<sup>20</sup> Ibid 3, paragraph 70, page 17

<sup>21</sup> Ibid 3, paragraph 77, page 18 to 19

<sup>22</sup> Ibid 3, paragraphs 78 to 82, pages 19 to 20

<sup>23</sup> Ibid 3, paragraphs 83 to 94, pages 20 to 22

<sup>24</sup> Please note that the use of the terms ‘significant risk’ and ‘not significant risk’ have been retained in the PIR write-up purely for the purposes of making the findings more directly comparable with the original impact assessment. A more appropriate terminology would be ‘higher risk’ for ‘significant risk’ and ‘lower risk’ for ‘not significant risk’.

<sup>25</sup> Ibid 23

<sup>26</sup> Ibid 3, paragraphs 95 to 123, pages 22 to 26

<sup>27</sup> Ibid 3, paragraph 70, page 17

Position of person who implemented EMF 2016 regulations	No. of responses	What is/was their position?	No. of responses
Other: (see below for further details)	26 (17%)		
<i>Corporate H&amp;S department (Occupational Hygienists) with assistance from local safety network</i>	<i>H&amp;S Team with significant support from (ionising) radiation safety due to a lack of other, appropriate experts.</i>	<i>Project Engineers - EMF/EMC discipline experts supporting projects in industry (particularly rail). Have also supported internal application - e.g. for site visits where this is relevant.</i>	
<i>Delegated duty from CO of each unit</i>	<i>Head of Radiation Protection / RPA</i>	<i>Project Manager</i>	
<i>EMC Engineer</i>	<i>Lowly paid dogsbody with the right degree</i>	<i>RF Safety Advisor</i>	
<i>EMC Engineer as part of the assessment process for new installations</i>	<i>Medical physicist</i>	<i>Safety team</i>	
<i>EMF specialists</i>	<i>MRI safety advisor but implemented to all areas within the hospital</i>	<i>Senior RF Engineer</i>	
<i>Employee</i>	<i>My NDT team who were aware of impending regulations however this was then taken up with our Occupational Health team as the company I work for is involved with electricity generation, so EMF issues are across all areas of our activity</i>	<i>Specialist Engineer (Myself)</i>	
<i>Engineer</i>	<i>NIR safety officer (we had one anyway)</i>	<i>State Registered Clinical Scientist</i>	
<i>Facilities Manager</i>	<i>No central implementation</i>	<i>Non-Ionising Radiation Safety Adviser</i>	
<i>H&amp;S consultant (with substantial scientific background)</i>	<i>Not done, as far as I know</i>		

59. Responses to this question seem to be generally reflective of the assumption within the original IA that the appropriate wage rate for the individual directly involved in the implementation of EMF 2016 is for a ‘health and safety officer’ / occupation ‘managers, directors and senior officials’.

### Scoping Costs

60. On the online survey, stakeholders were asked the following question – ‘It was originally estimated that it would take approximately 10 minutes for businesses to check whether they were in scope of the EMF regulations (five minutes to find the HSE guidance, then five minutes to look through to see if any of the workplaces and equipment listed were relevant to the business). Based on your experience, how accurate is this estimate?’.

No. of respondents	Evidence
<i>n = 156 (full or partial)</i>	<i>This question was answered by over three-quarters (76%, 119) of respondents. Nearly three quarters (72%, 86) of those who responded indicated that, in general, the original</i>

No. of respondents	Evidence
responses to survey)	estimate was too low (with four in ten [40%, 48] saying that it was much too low). In contrast only one in five (20%, 24) suggested that it was ‘about right’. Only one person said that it was much too high and 8 people did not know or were unsure.

61. Of those people who indicated that the figure from the original IA was not correct, the following open question was asked with just over two-thirds (68%, 81) providing some indication or estimate what they thought the correct figure was (please note - a more detailed analysis of these alternative figures is included in the CBA. In addition, inexplicably a couple of respondents who indicated ‘about right’ also provided a time estimate, one for 60 minutes and one for 10 minutes; these figures are included in the 81 responses mentioned above): *‘Can you please provide a general estimate of how long it took in minutes to check whether your business was in scope of the new EMF regulations? Please provide the answer in terms of whole minutes (e.g. 5 or 6, rather than 5.25 minutes or 5 mins 30 seconds).’*

Time	No. of responses	Comments
1 to 30 minutes	32 (39%)	
31 to 59 minutes	1 (1%)	
Between 1 and 2 hours	18 (22%)	
More than 2 hours	15 (19%)	There were a number of extreme estimates provided, including two people indicating 1,000 minutes (approximately 17 hours), two people indicating 2,000 minutes (33 hours) and one person indicating 2,500 minutes (42 hours).
Other	13 (16%)	In general the comments provided tended to reflect the fact that scoping took significantly longer than the estimated 10 minutes as detailed in the original IA. Some of the indicative comments included: <i>“4 years plus! Plus negotiation time with EU, HSE &amp; UK Gov”</i> <i>“Days rather than minutes”</i> <i>“Over 400 hours (Railway Infrastructure and bespoke equipment)”</i> <i>“The actual measurments [sic] take minutes - Reading the directive and acompanying [sic] paperwork takes days”.</i>
Don’t know / unclear	2 (2%)	

### Familiarisation

62. As detailed above, the estimates for familiarisation costs in the original IA were partially based on whether EMFs were a significant risk<sup>28</sup> in that sector (e.g. telecommunications and broadcasting sector, MRI, and energy) or not<sup>29</sup> (e.g. health sector, welding, plastics, the MOD and the rail sector). The survey therefore routed respondents who indicated they worked in a particular sector to answer a specific question about how long they took to familiarise themselves with EMF 2016; for business where EMFs were a significant risk it was estimated that familiarisation would take an hour, whilst those business where EMFs were not a significant risk it was estimated that familiarisation would take two hours.

63. In total, 117 respondents provided details about what the main focus of their business was; this represents about three quarters (75%) of the 156 people who responded overall. Of these 117, just above a third (36%, 42) indicated ‘Other’ when asked to identify their business. As such these ‘Other’ responses have not been included in the below summary, which only uses the remaining responses (75 in total) where a specific EMF high / low risk sector has been selected. **(Please note, in contrast to this approach, the CBA does include these ‘Other’ responses in its calculations, with full details provided there).**

**Businesses where EMFs are a significant risk<sup>30</sup> - telecommunications and broadcasting sector, MRI, and energy**

64. Of the 75 relevant responses, about a third (32%, 24) were from businesses where EMFs are a significant risk such as telecommunications and broadcasting, MRI and energy. They subsequently were asked the following question: *“It was originally estimated that it would take approximately 1 hour for businesses to familiarise and understand the new EMF 2016 requirements. Based on your experience, how accurate is this estimate?”*. Those people who indicated that the estimate was either too high or too low, were then asked: *“Can you please provide a general estimate of how long it took in minutes to familiarise and understand the new EMF 2016 requirements. Please provide the answer in terms of whole minutes (e.g. 45 or 90, rather than 1hr 30mins or 1.25 hours).”*

Sector	No. of responses	How accurate is the one-hour familiarisation estimate?	If not one hour, then what is the estimate (in whole minutes)?
Telecommunications and broadcasting sector	12	About right – 4 Too low – 6 Much too low - 2	2, 120, 120, 120, 240, 600, 1000 <i>“10 we knew the regulations would apply to us but did require some careful reading”</i>
MRI	7	About right – 2 Too low – 2 Much too low – 3	90, 450, 2000
Energy	5	About right – 1 Too low – 3	90, 120, 180,

<sup>28</sup> *Ibid* 23. These should be viewed as ‘higher risk’ sectors.

<sup>29</sup> *Ibid* 23. These should be viewed as ‘lower risk’ sectors.

<sup>30</sup> *Ibid* 23. These should be viewed as ‘higher risk’ sectors.

		Don't know / unsure – 1	
<b>Total</b>	<b>24</b>		

**Businesses where EMFs are not a significant risk<sup>31</sup> - health sector, welding, plastics, the MOD and the rail sector.**

65. Of the 76 relevant responses, about two thirds (68%, 52) were from businesses where EMFs are not a significant risk such as health sector, welding, plastics, the MOD and the rail sector. They subsequently were asked the following question: *“It was originally estimated that it would take approximately 2 hours for businesses to familiarise and understand the new EMF 2016 requirements. Based on your experience, how accurate is this estimate?”*. Those people who indicated that the estimate was either too high or too low, were then asked: *“Can you please provide a general estimate of how long it took in hours to familiarise and understand the new EMF 2016 requirements. Please provide the answer in terms of whole hours (e.g. 1 or 2, rather than 1hr 30mins or 1.25 hours).”*

Sector	No. of responses	How accurate is the two-hour familiarisation estimate?	If not two hours, then what is the estimate (in whole hours)?
Health sector	14	Much too high – 1 About right – 4 Too low – 2 Much too low - 7	2, 4, 8, 8, 10, 15, 20, 30000 <i>“It takes a lot longer than 2 hours to read HSG281 let alone understand how you comply!”</i>
Welding	14	About right – 6 Too low – 3 Much too low – 3 Don’t know / unsure - 2	5, 6, 20, 20
Plastics	1	No response	No response
MOD	13	About right – 2 Too low – 4 Much too low – 7	3.5, 5, 7, 18, 30, 80, 200 <i>“2 years + to understand the implications of SAR testing etc”</i> <i>“For me two weeks and then are other people in the business at other sites so it will be at an estimate 400 man hours.”</i>
Rail sector	9	About right – 6 Too low – 2 Much too low - 1	2, 10, 80,
<b>Total</b>	<b>51</b>		

**Assessing exposure and updating risk assessments**

66. In order to estimate the costs of assessing exposure and updating risk assessment due to EMF 2016, the original IA considered the previously identified high risk sectors (telecommunications and broadcasting, MRI and energy) and low risk sectors (health, welding, plastics, the MOD and the rail sector) alongside the size of the business. The IA stated *“[i]n line with current requirements, only businesses with 5 or more employees will need to record their exposure assessments and record the updates to their risk assessments. Those with fewer than 5 employees will only need to undertake the exposure assessment and update their risk assessments, but won’t have to record either of these actions.”*<sup>32</sup> The time taken to undertake the assessment of risks for

<sup>31</sup> *Ibid* 23. These should be viewed as ‘lower risk’ sectors.

<sup>32</sup> *Ibid* 3 – paragraph 98, page 22

businesses with 5 or more employees was estimated to be an hour, whilst those businesses with fewer than 5 employees would take 30 minutes.

67. As business size was only relevant to those sectors defined by the original IA as being high and low risk, only the previously identified 75 responses which indicated that they worked in one of these sectors were considered. Only one of the businesses which provided details of what sector it was in did not provide further information about business size. The final sample was therefore 74 businesses.

#### Businesses with 5 or more employees

68. Of the 74 relevant responses, well over nine in ten (96%, 71) were from businesses with 5 or more employees. They were subsequently asked the following question: *“It was originally estimated that it would take approximately 1 hour for businesses to undertake an EMF exposure assessment, record the findings and update the necessary risk assessment(s). Based on your experience, how accurate is this estimate?”*. Those people who indicated that the estimate was either too high or too low, were then asked: *“Can you please provide a general estimate of how long it took in minutes to undertake an EMF exposure assessment, record the findings and update the necessary risk assessment(s). Please provide the answer in terms of whole minutes (e.g. 45 or 90, rather than 1hr 30mins or 1.25 hours).”*

Business size	No. of responses	How accurate is the one-hour assessment estimate?	If not one hour, then what is the estimate (in whole minutes)?
5 – 9 employees	1	Much too low - 1	60
10 – 24 employees	5	Too low – 2 Much too low - 3	120, 120, 480 <i>“Complete nonsense, have you ever tried to do an exposure assessment based upon no supplier data or any information relating to employees at particular risk?”</i>
25 – 49 employees	2	Too low – 2	60
50 – 99 employees	4	Too low – 3 Much too low – 1	90, 120, 1000 <i>“Not done, but would estimate a full 8 hour shift, i.e. 480 minutes”</i>
100 – 249 employees	7	Too high - 1 About right – 1 Too low – 3 Much too low – 1 Don’t know / unsure - 1	90, 120, 240, 240 <i>“For us in the radio communications industry it is an ongoing activity on our sites”</i>
250 – 499 employees	4	About right – 2 Too low – 1 Much too low - 1	30 <i>“Not fully understood to carry out thorough assessment”</i>
500 – 999 employees	4	Too low – 2 Much too low – 2	120, 480, 480 <i>“1 day with consultation”</i>
1000+ employees	44	About right – 7 Too low – 9 Much too low – 27 Don’t know / unsure - 1	2, 7, 18, 18, 20, 90, 90, 90, 90, 105, 120, 200, 240, 240, 360, 420, 600, 1000, 1260, 2000, 2880, 4000, 7000

			<p>“15 days”</p> <p>“upto 4 weeks for a practical EMF Safety assessment of sites with numerous complex RF emitters”</p> <p>“120 mins per building, locations have some circa 50 buildings, many many locations.”</p>
<b>Total</b>	<b>71</b>		

### Businesses with fewer than 5 employees

69. Of the 74 relevant responses, only three (4%) were from businesses with fewer than 5 employees; two self-employed and one from a business with 1 – 4 employees. They were subsequently asked the following question: “*It was originally estimated that it would take approximately 30 minutes for businesses to undertake an EMF exposure assessment and update the necessary risk assessment(s). Based on your experience, how accurate is this estimate?*”. Those people who indicated that the estimate was either too high or too low, were then asked: “*Can you please provide a general estimate of how long it took in minutes to undertake an EMF exposure assessment and update the necessary risk assessment(s). Please provide the answer in terms of whole minutes (e.g. 60 or 90 minutes, rather than 1hr 30mins or 1.25 hours).*”

Business size	No. of responses	How accurate is the 30 minute assessment estimate?	If not 30 minutes, then what is the estimate (in whole minutes)?
Only me (self-employed)	2	Much too low – 1 Don’t know / unsure - 1	40
1 – 4 employees	1	Too low - 1	360
<b>Total</b>	<b>3</b>		

### Recurring costs

70. The original IA also considered the issue of EMF-emitting equipment having to be replaced. To this end, it determined that “[e]very time a business replaces equipment that emits EMFs, they will have to reassess exposure, record this assessment and update their risk assessment. The time taken for this is assumed to be the same as when the Regulations first applied – i.e. 1 hour ... if the business has 5 or more employees and 30 minutes ... if fewer than 5 employees. This is because the same process will have to be undertaken to gather information about the likely exposure and then to update the risk assessment, recording as necessary”<sup>33</sup>.

71. Utilising the same dataset as above, consisting of high risk sectors (telecommunications and broadcasting, MRI and energy) and low risk sectors (health, welding, plastics, the MOD and the rail sector) alongside the size of the business, the number of responses who provided answers against each of these categories was 74. As such the following question was asked “*It was originally estimated that equipment which emits EMFs will*

<sup>33</sup> *Ibid* 3 – paragraph 111, page 24



be replaced, on average, every 10 years. Based on your experience, how accurate is this estimate?”. Those people who indicated that the estimate was either too high or too low, were then asked: “Can you please provide a general estimate of how long in years, on average, equipment which emits EMFs will be replaced? Please provide the answer in terms of whole years (e.g. 12 or 20, rather than 10.5 years or 15-17 years).”

<b>Businesses with 5 or more employees</b>			
<b>Sector</b>	<b>No. of responses</b>	<b>How accurate is the 10-year EMF equipment replacement estimate?</b>	<b>If not 10 years, then what is the estimate (in whole years)?</b>
Energy	5	About right – 2 Too low – 1 Much too low – 1 Don't know / unsure - 1	30, 40
MRI	7	Too high – 1 About right – 4 Much too low - 2	15, 15
Health sector	13	Much too high – 1 About right – 7 Much too low – 3 Don't know / unsure - 2	2, 15 <i>“A lot of plant equipment is on a 20 plus year replacement schedule. MRI scanners can be in use for approx 15 years in some places and still then have a resale value.”</i>
Welding	13	Too high - 2 About right – 2 Too low – 1 Much too low – 2 Don't know / unsure – 5 No response - 1	5, 6, 15, 15, 15,
Telecommunications and broadcasting	12	Too high - 1 About right – 5 Too low – 3 Much too low - 1 Don't know / unsure - 2	4, 5, 15, 20, 20, 45
MOD	13	Too high – 1 About right – 1 Too low – 3 Much too low – 3 Don't know / unsure - 4 No response - 1	20, 25, 30, 35, 6787 <i>“Many military equipment's date from 1990's etc 20 yrs+”</i> <i>“between 10 and 30 years within some MOD establishments.”</i>
Rail sector	8	About right – 3 Too low – 3 Much too low – 1 Don't know / unsure - 1	20, 20, 30 <i>“contracts require a minimum 10 year lifespan”</i>
<b>Businesses with fewer than 5 employees</b>			
Health sector	1	Much too high – 1	3
Rail sector	1	Don't know / unsure - 1	
Welding	1	About right - 1	
<b>Total</b>	<b>74</b>		

72. Overall, reflecting the more detailed analysis of the data within the CBA, the estimates from the original impact assessment have been updated in the following way:

<b>Estimated average time taken to comply with EMF 2016</b>		
<b>Cost category</b>	<b>Time estimates from the 2016 IA</b>	<b>Estimated time based on survey data for this PIR</b>
<b>Scoping time</b>	10 minutes	30 minutes
<b>Familiarisation – higher-risk</b>	1 hour	2 hours
<b>Familiarisation – lower-risk</b>	2 hours	4 hours
<b>Risk assessment and exposure (&lt;5 employees)</b>	30 minutes	3 hours
<b>Risk assessment and exposure (&gt;5 employees)</b>	1 hour	4 hours
<b>Average replacement period for EMF-emitting equipment</b>	10 years	10 years

### Summary of updated costs

73. Utilising the ‘actuals’ data summarised above, the cost estimates from the original IA have been updated for the PIR:

<b>Summary of Costs and Benefits (£millions, 2015 prices, 2016 present value base year)</b>		
<b>Equivalent annual costs<sup>34</sup></b>		
<b>Cost category</b>	<b>The 2016 IA</b>	<b>Revised PIR estimates</b>
Scoping costs	0.4	1.5
Familiarisation	0.9	2.0
Assessing exposure and updating risk assessment	0.4	2.5
<b>Total</b>	<b>1.7</b>	<b>6.0</b>

74. The headline figure is that the revised estimate of costs based on the analysis within the accompanying CBA report suggests that the equivalent annual net cost (EANDB) of EMF 2016 is £6.0 million (2015 prices, 2016 present value). In comparison, the 2016 IA originally estimated the EANDCB of the EMF Regulations to be £1.66m (2014 prices, 2015 present value) (rounded to £1.7 million).<sup>35</sup>

75. As mentioned previously full details of the costs are detailed in the Cost Benefit Analysis (Annex 2).

### ***vi. Has the evidence identified any opportunities for reducing the burden on business?***

<sup>34</sup> The equivalent annual cost is the constant annual cost over the appraisal period which gives the same net present value as is calculated using actual costs. This provides a common metric to compare costs from different interventions with different lengths of appraisal period. Costs to the public sector (MRI and a percentage of the health sector) do not affect these rounded figures, and so these figures also represent the EANDCB. Components of the equivalent annual costs for the 2016 IA are presented here rounded to one decimal place for this purpose, for ease of presentation. The 2016 IA estimated its final EANDCB figure in 2014 prices, 2015 present value for the purposes of the Business Impact Target. We present it here in 2015 prices, 2016 present value for simplicity and ease of comparison. This change does not affect the rounded total EANDCB figure of £1.7m.

<sup>35</sup> The 2016 IA estimated its final EANDCB figure in 2014 prices, 2015 present value for the purposes of the Business Impact Target. This rounded figure of £1.7m does not change when updated to 2015 prices, 2016 present value.

76. As well as asking directly about whether the objectives of EMF 2016 could be achieved with a system which imposes less regulation, the PIR also asked respondents whether they thought current legislative and/or advisory structures are sufficient for regulating EMFs irrespective of the EMF 2016 regulations (i.e. there is not a need for EMF 2016 - this was HSE's view prior to implementing the EU directive around EMFs).

**Can the objectives of EMF 2016 be achieved with a system that imposes less regulation?**

77. Respondents to the survey were directly asked whether they believed “that the objectives of EMF 2016 could be achieved with a system that imposes less regulation?”.

No. of respondents	Evidence
n = 156 (full or partial responses to survey)	More than eight in ten (83%, 130) survey respondents answered this question, with nearly half (48%, 63) indicating that the objectives of EMF 2016 could not be achieved by a system with less regulation. Of the remaining responses, just over a quarter (27%, 35) said that they did not know or were unsure and a final quarter (25%, 32) said that the EMF 2016 objectives were achievable with less regulation.

78. Of those respondents who indicated that the objectives of EMF 2016 were achievable with less regulation (25%, 32), over three quarters (78%, 25) provided further detail in response to the question “[p]lease briefly describe what such a system would look like”.

What would a system which imposes less regulation than EMF 2016 look like	Count of main theme
Make part of existing legislation	7 (28%)
Simpler prescriptive ACOP/guidance	3 (12%)
Incorporate limits into equipment	3 (12%)
Cover high exposure only	2 (8%)
Risk assessment	2 (8%)
Base on noise regulations	1 (4%)
Based in contemporary levels data	1 (4%)
Control sales of EMF emitting equipment	1 (4%)
Current legislation ignored	1 (4%)
Industry specific	1 (4%)
Measure exposure	1 (4%)
Target medical risk	1 (4%)
Unclear	1 (4%)
<b>Grand Total</b>	<b>25</b>

79. About a quarter (28%, 7) of those who provided further information about what type of system could fulfil the same aims as the 2016 EMF regulations asserted that this could be done by incorporating the rules into existing tracts of legislation; the most popular being the Health and Safety at Work Act 1974. A further one in ten (12%, 3) posited the idea of introducing a simpler, prescriptive set of guidance accompanied by a similarly light-touch Approved Code of Practice (ACOP); the idea being that this would

make potential risks clear and simpler to model. One in ten respondents (12%, 3) also suggested that equipment should be manufactured to automatically limit EMF emissions or should be calibrated to emit EMFs at certain levels.

80. Interestingly, all (28%, 7) those indicating that a less onerous regulatory system could be achieved by moving the rules into existing legislation were from businesses which employ more than a thousand people. (It should be noted, however, that over half [56%, 14] of all responses to this question came from large employers [over 1,000 employees], again reflecting the prevalence of such business in the overall sample). In terms of sectors, three of the aforementioned large employers dealt with MRIs in the health sector whereas, the MoD provided six varied responses and a further four varied responses came from businesses with 25 – 49 employees.

**Can EMFs be controlled using existing health and safety legislation and standards?**

81. The above question about how to achieve the objectives of EMF 2016 but with less regulation identified the use of existing legislation as one of the primary suggested approaches. Serendipitously, a subsequent question in the online survey asked a question reflecting this idea; the question asked respondents to agree or disagree with the statement *‘EMF 2016 is not needed as the risks presented by EMFs can be controlled using existing health and safety legislation with reference to international standards (e.g. International Commission on Non-Ionising Radiation [ICNIRP])’*.

No. of respondents	Evidence
n = 156 (full or partial responses to survey)	Over two thirds (69%, 108) of the 156 people overall who responded to the survey provided an answer to this question. Just under a third of these (31%, 34) disagreed with the statement and a further one in five (20%, 22) strongly disagreed. On the other side, only a quarter (29%, 31) agreed with the statement, relatively evenly split between agree (14) and strongly agree (17). Of the remaining responses, about one in six (14%, 15) were neutral (neither agreeing or disagreeing) and a final five per cent (6) did not know.

82. Over half (52%, 56) of respondents disagreed with the statement, indicating that they thought EMF 2016 was still needed to control the risk presented by EMFs. The reason behind their rejection of the statement were explored further with the question “[p]lease briefly explain why you disagree with the statement that EMF 2016 is not needed as the risks presented by EMFs can be controlled using existing health and safety legislation with reference to international standards (i.e. why is EMF 2016 still needed)”, with over nine in ten respondents (93%, 52) providing further details.

Why is EMF 2016 needed	Count of themes
EMF 2016 makes standards and controls around EMFs specific, explicit and enforceable	24 (46%)
The specialist nature of EMFs means that dedicated legislation is necessary	10 (19%)
Draws attention, and increases awareness, of the invisible hazard of EMFs	10 (19%)
Unclear	5 (10%)

Needs better enforcement, not replacement	1 (2%)
Brings ELVs into legislation	1 (2%)
EMF 2016 protects workers from unnecessary exposure of EMFs	1 (2%)
<b>Grand Total</b>	<b>52</b>

83. Nearly half (46%, 24) of respondents indicated that EMF 2016 should be retained as it provided clarity and the ‘power’ of legally binding requirements around what should be done to control EMF exposure. With the potential impacts of EMFs only now becoming better understood, one in five (19%, 10) people also indicated that EMF 2016 helped provide explicit guidance in a relatively new and complex area of regulation. Furthermore, one in five (19%, 10) respondents noted that the simple presence of the EMF 2016 regulations helped raise the profile of EMF risks. Some of the comments around these points included:

*“[B]ecause it makes the standards and controls much easier to access and makes them far more specific and explicit.”*

*“Due this subject matter being very bespoke and a specialised risk this will not always be highlighted in other legislation controls still needs to regulation on its own.”*

*“I think it is needed to focus peoples [sic] attention on an invisible hazard.”*

84. In contrast to those supporting the retention of EMF 2016, those respondents who indicated that they agreed with the statement – suggesting that EMF 2016 is not needed and that EMF risks can be regulated via current legislation – were subsequently asked why they agree via the following question: “[p]lease briefly explain why you agree with the statement that EMF 2016 is not needed as the risks presented by EMFs can be controlled using existing health and safety legislation with reference to international standards (i.e. why EMF 2016 is not needed)”. Of the 31 people who ‘agreed’ or ‘strongly agreed’ with the statement, nine in ten (90%, 28) provided further details within the following broad themes:

<b>Why is EMF 2016 not needed</b>	<b>Count of themes</b>
Knowledge and adherence to current standards enough	10 (36%)
Most EMFs risks are too low for dedicated legislation, and high-risk EMFs are already managed	6 (21%)
Risks from EMFs managed perfectly well before EMF 2016	4 (14%)
EMFs are effectively dealt with under other legislation such as Management of Health and Safety at Work Regulations 1999 (MHSW) and Health and Safety at Work Act 1974 (HASWA)	2 (7%)
EMF 2016 simply complicates matters	2 (7%)

Existing framework sufficient (unclear what framework is being referred to)	1 (4%)
New EMF guidance needed for employers	1 (4%)
Unclear	1 (4%)
Need for EMF-emitting equipment to be labelled at source	1 (4%)
<b>Grand Total</b>	<b>28</b>

85. Over a third (36%, 10) of people who provided an explanation for why they agreed with the statement that EMF 2016 is not needed said it was due to current standards being appropriate to manage the risks of EMFs. In a similar vein, nearly one in ten respondents (7%, 2) said that current legislation was enough to manage EMF risks. One in five (21%, 6) people also felt that the risks of EMFs were relatively low to justify a dedicated piece of legislation, with business who had high levels of EMFs already dealing with them. Finally, about one in six (14%, 4) said that the risks of EMFs were managed perfectly well prior to EMF 2016 coming into force. Some of the comments made include:

*“ICNIRP [International Commission on Non-Ionizing Radiation Protection] guidance is given in context rather than the over simplistic, blunt (statutory) instrument of legislation”*

*“I believe the risks are extremely low relative to other risks which are not specifically managed by dedicated legislation. To me it appears any source that requires an exemption because [sic] it is "required" [sic] (e.g. MRI) is simply given exemption status...”*

*“Worked before the directive was implemented”*

86. In summary, about half of those respondents who answered the question about whether the EMF 2016 objectives could be achieved with a system which imposed less regulation said that it could not. Similarly, about half of the people responding to the statement indicating that EMF 2016 was not needed also disagreed. The general view seems to be that the control of EMFs is best served via the EMF 2016 regulations. The main reason given in respect of the latter question is that the legislative nature of the EMF 2016 regulations ensures that controls around EMFs are specific, explicit and enforceable. The opposing view is held by about a quarter of respondents for both questions, and these respondents suggest that the control of EMFs can be managed via existing legislation and standards.

***vii. For EU measures, how does the UK's implementation compare with that in other EU member states in terms of costs to business?***

The UK officially left the EU on 31<sup>st</sup> January 2020. The transition period that was in place then ended on 31 December 2020, with the rules governing the new relationship between the EU and UK taking effect on 1 January 2021. Reflecting the UK's changed relationship with the EU, and with the UK no

longer being an EU member state, it was deemed inappropriate – and disproportionate – to approach EU member states in order to gather information about how they had implemented the EMF regulations.

## Annex 2 - The Costs and Benefits of the Electromagnetic Fields at Work Regulations 2016 (EMF 2016)

### 1. Introduction

1. The Control of Electromagnetic Fields at Work Regulations 2016 (hereafter referred to as 'EMF 2016') were brought into force to implement the European Physical Agents (Electromagnetic Fields) Directive 2013/35/EU. As part of the Post Implementation Review (PIR) of EMF 2016, this report provides a cost benefit analysis (CBA) of the realised costs and benefits of EMF 2016 to-date; and the projected costs of EMF 2016 over the remainder of the original impact assessment (IA) 10-year appraisal period up to 2026.
2. This analysis focuses on re-estimating the costs of EMF 2016 that were identified in the original IA<sup>36</sup> (hereafter referred to as 'the 2016 IA'). These costs include both ongoing costs; and one-off costs, which were costs incurred at the point of implementation in 2016. All costs have been re-estimated. Whilst the one-off costs are perhaps less relevant to current decision-making, their inclusion facilitates a test of how realistic the assumptions were in the 2016 IA and provide a learning opportunity for future analysis of regulations.
3. A summary of the main cost impacts of EMF 2016, identified in the 2016 IA is as follows:
  - Scoping costs
  - Familiarisation costs
  - Exposure assessments and risk assessment costs
4. All of these costs are explained and then re-estimated in the relevant sections below.
5. The 2016 IA estimated costs in 2015 prices. The 2015 price base year has been maintained in this CBA for simplicity and to aid comparison between the 2016 IA and this CBA. Other data sources have been updated, including the estimated time to comply with EMF 2016 and the estimated numbers of duty holders.
6. The 2016 IA estimated the present value of costs using a 2016 base year (that is, the year that costs relating to EMF 2016 commenced). This 2016 present value base year has been maintained in this CBA for simplicity and to aid comparison between the 2016 IA and this CBA.
7. In our presentation of costs from the 2016 IA and this CBA, we round to two significant figures unless otherwise stated.<sup>37</sup> As a result of this rounding, some totals may not appear to equal the sum or product of their components.
8. This analysis starts with a summary of the estimated costs in the 2016 IA and a summary of the data sources used to estimate those costs; the report then sets out the baseline for the CBA and the scope of the work; a detailed section about the evidence-gathering and research undertaken to inform the updated estimates follows; then a summary of assumptions used in the analysis and a detailed section on the monetised costs of EMF 2016.

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<sup>36</sup> Available at: [https://www.legislation.gov.uk/ukia/2016/129/pdfs/ukia\\_20160129\\_en.pdf](https://www.legislation.gov.uk/ukia/2016/129/pdfs/ukia_20160129_en.pdf)

<sup>37</sup> Wages and average costs per business are not rounded, as total costs are very sensitive to these variables.



## 2. EMF 2016 Impact Assessment

### 2.1 Overview of Estimated Impacts

9. Table 1 below provides a summary of the costs as estimated in the 2016 IA.

**Table 1: Summary of costs as estimated in the 2016 IA (£ millions, 2015 prices, present value base year 2016)**

	<b>NPV<sup>a</sup> over 10 years</b>	<b>Equivalent annual costs<sup>b</sup></b>
i) - Scoping costs (one-off)	3.7	0.4
ii) - Familiarisation (one-off and ongoing)	7.8	0.9
iii) - Exposure and Risk assessment (one-off and ongoing)	3.5	0.4
<b>Total<sup>c</sup></b>	<b>15</b>	<b>1.7</b>

Source: EMF 2016 final impact assessment

a: Net present value is the sum of discounted costs over the 10-year appraisal period

b: The equivalent annual cost is the constant annual cost over the appraisal period which gives the same net present value as is calculated using actual costs. This provides a common metric to compare costs from different interventions with different lengths of appraisal period. The costs to the public sector in the 2016 IA do not affect these rounded figures, being so small, and so these figures also represent the Equivalent Annual Net Direct Cost to Business (EANDCB). The 2016 IA estimated its final EANDCB figure in 2014 prices and 2015 present value for the purposes of the Business Impact Target. We present it here in 2015 prices, 2016 present value for simplicity. This change does not affect the rounded total EANDCB figure of £1.7m.

c: Components may not appear to sum to total due to rounding

10. All of these cost areas are discussed and re-estimated in this CBA. Scoping costs (i) are assessed in section 6.1, familiarisation costs (ii) are assessed in section 6.2, and the costs of assessing exposure levels and updating risk assessments (iii) are assessed in section 6.3.

### 2.2 Summary of 2016 IA data sources

11. The 2016 IA was based on multiple sources, which were:
- Formal public consultation, targeted questions to Industry Working Group representatives in affected industry sectors (hereafter referred to as 'EMF IWG'); and follow-up teleconferences. These sources informed estimates of how much time businesses would spend checking if they were in scope of EMF 2016; and if they found themselves to be in scope, the time they would spend familiarising themselves with the regulations and complying with them. Furthermore, the sources informed the 2016 IA's estimate of the capital replacement rate (how often firms replaced their outdated equipment) in in-scope businesses. See the 2016 IA, paragraphs 64-66, for further information.
  - Data from the Annual Survey for Hours and Earnings (ASHE)<sup>38</sup> was used in the IA to estimate the full economic cost of time for duty holders<sup>39</sup>.

<sup>38</sup> ONS Annual Survey of Hours and Earnings (ASHE) 2015 (provisional)

<sup>39</sup> Duty holders' full economic cost of time in the MRI sector were based on published NHS Agenda for Change pay rates, see paragraph 71 of the 2016 IA for further details.

- c) BIS Business Population Estimates<sup>40</sup> were used to estimate the proportion of in-scope businesses with fewer than five employees.
  - d) The ONS Business Demography<sup>41</sup> was used to estimate the number of businesses in sectors affected by EMF 2016.
  - e) The ONS Business Demography (see footnote 41) was also used to estimate the number of new businesses each year in sectors in scope of EMF 2016.
  - f) A combination of data published by the Health and Social Care Information Centre, the Information Services Division (ISD) Scotland, NHS Wales, The Complete University Guide as well as HSE sector specialist estimates were used to estimate the number of duty holders in the Health and Magnetic Resonance Imaging (MRI) sectors that would have additional duties as a result of EMF 2016 (see paragraph 77 of the 2016 IA for further details).
12. In undertaking the present assessment, we have reviewed and updated these data sources, commissioned new primary research, and improved the method of estimation for (e). See Section 4 for further discussion of the evidence gathering undertaken, and Section 5 for further discussion of estimation changes.

### 3. Scope and Baseline of this Cost Benefit Analysis

- 13. The 2016 IA estimated the costs to society<sup>42</sup> that would result from EMF 2016 over a 10-year appraisal period, from the point of implementation in mid-2016 to mid-2026. This assessment keeps the same appraisal period and aims to estimate the actual, realised costs resulting from EMF 2016 for the period mid-2016 to mid-2019; and make new estimates of costs for mid-2019 to mid-2026 based on more recent data and new primary research.
- 14. The baseline of this PIR is the same as the 2016 IA: that is, a scenario where EMF 2016 was not introduced and organisations managing the workplace risks arising from EMFs by adhering to general duties in the Health and Safety at Work Act etc. 1974 and the Management of Health and Safety at Work Regulations 1999.
- 15. The analysis that follows re-estimates the average cost per business incurred as a result of different aspects of EMF 2016; and re-estimates the number of businesses in sectors identified by the 2016 IA as incurring these costs.
- 16. The analysis does not reassess which industry sectors incur costs. This is because the authors of the 2016 IA were guided by extensive consultation and expert opinion on general electromagnetic field (EMF) levels and risk-levels in different sectors to identify the main affected sectors. The amount of work required to reassess which sectors incur scoping costs would be disproportionate to the change in total costs that could result (see section 6.1.2 for further discussion), and research conducted for this PIR generally confirms the main sectors identified by the 2016 IA as incurring other costs (see section 6.2.2 and section 6.3.2 for further discussion).
- 17. The analysis re-estimates the costs which were identified in the 2016 IA. The PIR survey (see paragraph 18) asked respondents if there have been other costs as part of the EMF 2016 changes. A total of 75 responses were received to this question, of which almost 30% said there had not been any further costs other than those already identified by the survey. Of the other cost categories

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<sup>40</sup> Department for Business Innovation and Skills (BIS), Business Population Estimates for the UK and Regions 2015

<sup>41</sup> ONS business demography data 2015

<sup>42</sup> Only indirect benefits were identified in the 2016 IA, and these were not monetised. See paragraphs 126-129 of the 2016 IA for further details.

mentioned, 13% of respondents mentioned staff training, 10% mentioned external contractor costs and 10% mentioned time spent. The rest of the responses were split over a range of topics such as signage, health-monitoring and research. It is understood from HSE policy leads that the majority of these costs that respondents have mentioned are things that they would be required to do under other general health and safety law and not specific additional requirements of EMF 2016. Therefore, these costs have not been explored further in this analysis and the CBA focuses on the additional costs of EMF 2016 only.

## 4. Research and Evidence-Gathering

18. We used multiple evidence sources to re-estimate the impact of EMF 2016. The specific sources of data used to derive quantitative estimates for this CBA are summarised below:

- A survey, sent to various stakeholder groups, forms the main evidence source for this CBA. The survey included questions asking businesses about the time they spent checking if they were in scope of the regulations, familiarising themselves with the regulations, and then adhering to the additional requirements in the regulations (the three main cost areas identified by the 2016 IA). Furthermore, the survey asked how often organisations replace their equipment (another key parameter in the 2016 IA). The survey was sent to the following groups:
  - EMF IWG (17 contacts). This group was set up when the EMF regulations were being developed 2013-16.
  - Respondents to the EMF consultation in 2015 (45 contacts).
  - Trade associations/ groups for sectors identified in the 2016 IA as being in scope of EMF 2016, but not covered in either of the above lists of contacts - this included the rail and plastics manufacturing sectors (two contacts).
  - Members of HSE's Radiation Community of Interest (CoI). This is an online forum HSE runs relating to issues around EMF. A link to the survey, with a covering explanation, was posted on the forum and CoI members were alerted (647 contacts).

In total 139 full or partial responses were received. Only six respondents stated that their organisation had fewer than five employees, and only five respondents stated that the main focus of their organisation was welding.

- Due to low response numbers from welders (the largest group identified in the 2016 IA as being impacted by EMF 2016) and a low response rate from micro businesses (with fewer than 5 employees) we decided to try to collect additional data. The survey was re-issued with HSE purchasing a small item in 'Welding World' trade magazine promoting the EMF 2016 PIR survey, as well as sending an e-mail out to the 68,000 contacts on Welding World's mailing list. In addition, The Welding Institute sent out an e-mail to their members promoting the survey. In total, this generated 17 additional full or partial responses. Nine of these 17 respondents stated that the main focus of their organisation was welding, and only one of these 17 respondents stated that their organisation had fewer than five employees.
- Data from the Annual Survey for Hours and Earnings (ASHE) (see footnote 38) is used to estimate the full economic cost of time for duty holders.

- Updated data from BEIS Business Population Estimates<sup>43</sup> is used to estimate the proportion of in-scope businesses with fewer than 5 employees.
- Updated data from the ONS Business Demography<sup>44</sup> is used to estimate the number of businesses in sectors affected by EMF 2016.
- In contrast to the IA, we use sector-specific data from the ONS Business Demography to re-estimate the number of new businesses in scope of the regulations per year (the 2016 IA made estimates of new businesses using all business sectors). We also use a more recent version of the dataset (see footnote 44). See Section 5 for a more detailed discussion of these estimates.

## 5. General Assumptions, Risks and Uncertainties

19. The 2016 IA included costs and benefits that extended into the future. Consequently, it was important that any monetised impacts were expressed in present values, to enable comparison over time. The 2016 IA used a discount rate of 3.5% to generate these present values, as is recommended in the Green Book<sup>45</sup> for any appraisal period of less than 30 years. This assumption is maintained in this PIR.
20. Costs in both the 2016 IA and this PIR are in terms of opportunity costs. All costs identified in the 2016 IA result from EMF 2016 taking up the time of duty holders. The opportunity cost of EMF 2016 is therefore the value of what duty holders could have done/ could be doing with their time in the absence of EMF 2016. We assume, as in the 2016 IA, that the productivity of the person(s) carrying out duties related to EMF 2016 is best reflected by the cost of employing that person (they create as much value as employers pay to employ them). In reality this could be conservative for some occupations and staff, but is the best estimate available and is recommended by Government in the HM Treasury Green Book (see footnote 45). The 2016 IA assumes the true economic cost of the person(s) carrying out duties related to EMF 2016 to be their gross hourly wage rate uprated by 19.8% to reflect the non-wage costs of employment (such as employer tax and NI contributions and employer contributions to pension). This assumption is maintained in this PIR. Therefore, each hour spent by their scoping, familiarising with and adhering to EMF 2016 is assumed to cost businesses their wage plus 19.8%.
21. Research for the 2016 IA ascertained that the persons carrying out duties would be Health and Safety Officers in some cases; and Managers, Directors, or Senior Officials in others. Using data from the Annual Survey of Hours and Earnings (ASHE) (see footnote 38), the 2016 IA assumed that the average of the mean gross hourly wage rate for the occupation ‘health and safety officer’ and the mean gross hourly wage rate for the occupation ‘managers, directors and senior officials,’ uprated by 19.8% best represented the average full economic cost of time of the person(s) carrying out duties related to EMF 2016 (see paragraph 70 of the 2016 IA for further details). This gave a full economic cost of time of £25.80 per hour (2015 prices). There was only one comment received during the formal public consultation for the 2016 IA that suggested that this estimation was inappropriate, but the 2016 IA reasoned that this was due to the consultee overestimating the requirements of EMF

<sup>43</sup> Business population estimates 2016, available at: <https://www.gov.uk/government/statistics/business-population-estimates-2016>

<sup>44</sup> ONS Business demography 2019, available at: <https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/business-demography/2019>

<sup>45</sup> Available at: <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

2016 (see paragraph 70 of the 2016 IA for further details). For simplicity, to aid comparison, and on grounds of proportionality this PIR uses the same cost of time of £25.80 (2015 prices).<sup>46</sup> As in the IA, this PIR assumes this cost of time remains constant in real terms over the appraisal period for simplicity.<sup>47</sup>

22. Some of the costs of EMF 2016 identified by the 2016 IA are ‘one-off’ and are assumed to be incurred by all businesses (in affected sectors) that are active in the first year of the appraisal period (mid 2016 – mid 2017). The 2016 IA uses ONS Business Demography data (see footnote 41) on the number of active businesses in 2013 as an estimate for the number of businesses who incur ‘one-off’ costs (with the exception of the MRI and Health sectors – see paragraph 25 for further details). This PIR analysis uses ONS Businesses Demography data (see footnote 44) on the number of active businesses in 2016 as an estimate for the number of businesses who incur ‘one-off’ costs (again with the exception of the MRI and Health sectors – see paragraph 25 for further details). We acknowledge that this is not the same as the number of businesses active mid 2016 – mid 2017, but data is only available for each calendar year, so we adopt this approach for simplicity.
23. Most of the ongoing costs identified by the 2016 IA relate to new businesses entering the market. EMF 2016 is an additional set of regulations compared to the baseline and so creates additional burdens for new in-scope businesses. Therefore, it is necessary to estimate the number of new businesses each year in in-scope sectors. The 2016 IA used ONS Business Demography data to estimate annual business births by taking the average ‘rate’ of business births in the entire GB economy (total business births as a percentage of total active businesses the previous year) for the period 2010-2014, and applying this rate to the estimated number of in-scope businesses in 2016 (see paragraphs 88-90 of the 2016 IA for more detail). In this PIR, we use a dataset within the ONS Business demography which provides business births disaggregated by sector. We use actual births per annum in the in-scope sectors, averaged over the period 2016-2019 as our estimate for annual business births throughout the appraisal period. This is likely to give a more accurate estimate of actual business births for the first three years of the appraisal period (mid 2016 - mid 2019) as it is based on both more up to date data; and data more specific to the in-scope sectors than the 2016 IA. We acknowledge that business births are likely to be far lower than this average in 2020, 2021, and possibly in 2022 and beyond due to the economic impact of COVID-19. Despite this, we maintain our average estimate of annual business births throughout the appraisal period for three reasons:
- As a cautious, generous estimate given the lack of availability of data for 2020 and subsequent years, and the high degree of uncertainty around the speed and strength of recovery – i.e. we would rather err on the side of over-estimating the costs rather than risk underestimating them.
  - To provide an estimate of yearly ongoing costs incurred due to the regulations as they would be outside of these exceptional times, which we think is more relevant to decision makers, should they review the regulations in the future.
  - To allow for fair cost comparisons between this PIR and the 2016 IA, which could not predict COVID-19.

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<sup>46</sup> Used for all organisations other than the MRI sector.

<sup>47</sup> The possibility of significant trends in wages over time was considered, but from an analysis of ASHE data over time, we found no significant trends in real terms for these professions.

24. Compliance duties resulting from EMF 2016 differ for businesses with more than or equal to five employees compared to businesses with fewer than five employees. The 2016 IA used the Business Population Estimates for the UK and Regions data for number of businesses, by size in the whole UK economy (see footnote 40) to ascertain that approximately 90% of businesses in the UK had fewer than five employees, and approximately 10% of businesses had more than or equal to five employees. As the businesses in scope of EMF 2016 fall across a wide range of sectors across GB, the 2016 IA assumed that they follow the same distribution of business size, throughout the appraisal period.<sup>48</sup> Due to a lack of disaggregated data on numbers of businesses with fewer than five employees, this analysis follows the same approach, using updated data for 2016 (see footnote 43). This gives approximately 91% of businesses with fewer than five employees and 9% with more than or equal to five employees in the UK. As in the 2016 IA, we assume that businesses in-scope of EMF 2016 follow the same distribution in business size (see footnote 48).
25. The numbers of NHS trusts, private duty holders in the health sector, and MRI units in GB were estimated in the 2016 IA using various data sources<sup>49</sup>, which do not have updated figures for 2016 readily available. As these sectors accounted for around 0.5% of total costs in the 2016 IA, undertaking extra work in order to produce specific estimates for these sectors would be disproportionate to any change in costs that could result. We therefore use the figures provided in the 2016 IA (261 non-MRI NHS duty holders, 200 private-sector non-MRI health duty holders, and 648 public-sector MRI duty holders). As in the 2016 IA, we assume that any new units ‘born’ over the appraisal period in these sectors are negligible.
26. The 2016 IA used a full economic cost of time of £43.86 per hour for MRI duty holders (2015 prices).<sup>50</sup> For simplicity, to aid comparison, and on grounds of proportionality this PIR uses the same cost of time for the MRI sector.

## 6. Monetised Costs and Benefits

### 6.1 Scoping costs

27. There are many kinds of equipment which emit such low levels of EMFs that duty holders do not need to take any action under EMF 2016. These include, for instance, computer and IT equipment. Other kinds of equipment emit higher levels of EMFs, such that duty holders need to take additional action. These include, for instance, welding equipment. On becoming aware that there was new legislation covering EMFs specifically in 2016, organisations with either of these types of equipment would have to consider the Regulations and whether any new requirements apply to them. This was expected to take a short amount of duty holders’ time, and therefore be a cost to organisations.

#### 6.1.1 Original estimations from the 2016 IA

28. The 2016 IA estimated that it would take, on average, 10 minutes of duty holders’ time per organisation to check whether they were in scope of the regulations (see paragraph 81 of the 2016

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<sup>48</sup> For all sectors other than the Health sector, which is assumed to only consist of organisations with more than 5 employees (as it mainly consists of NHS trusts).

<sup>49</sup> See paragraph 77 of the 2016 IA for further details

<sup>50</sup> See paragraph 72 of the 2016 IA for further details.

IA for further detail). Using the average cost of time discussed in Section 5 of £25.80 per hour, this gives an average cost per business of £4.30 (2015 prices).

29. The authors of the 2016 IA analysed with internal HSE experts a list of industry sectors and judged which sectors were likely to use equipment which would give rise to uncertainty when the EMF 2016 regulations were introduced. Using the ONS Business Demography (2015) (see footnote 41), the 2016 IA estimated that approximately 870,000 organisations would be operating in these sectors in GB, in the first year of the appraisal period.<sup>51</sup>
30. Using the cost per business of £4.30, this gave a one-off cost to occur in the first year of the appraisal period of £3.7m (2015 prices). The 2016 IA did not estimate any further (ongoing) scoping costs. Therefore, the 2016 IA estimated that scoping would have a present value cost of £3.7m (2015 prices, 2016 present value).

### 6.1.2 Findings and estimations for the PIR

31. As discussed in section 4, we have gathered new evidence on how long organisations spent checking if they were in scope of the regulations. As part of the survey sent to the stakeholder groups described in section 4, we asked organisations:
- a) It was originally estimated that it would take approximately 10 minutes for businesses to check whether they were in scope of the EMF regulations (five minutes to find the HSE guidance, then five minutes to look through to see if any of the workplaces and equipment listed were relevant to the business). Based on your experience, how accurate is this estimate?
  - b) Can you please provide a general estimate of how long it took in minutes to check whether your business was in scope of the new EMF regulations? Please provide the answer in terms of whole minutes (e.g. 5 or 6, rather than 5.25 minutes or 5 mins 30 seconds).
32. The combined responses to question (a) questions were as follows:
- i) Around 72% (86 out of 119) said that the estimate of 10 minutes was too low or much too low
  - ii) Around 20% (24 out of 119) said that the estimate was about right
  - iii) A very small amount (1%, 1 out of 119) said that the estimate was too high
  - iv) The remaining 7% said 'don't know' or did not answer
33. Question (b) received 81 responses in total. Many respondents who answered 'about right' did not go on to give an exact estimate of time taken. When calculating the average response to question (b), we use a proxy response of '10 minutes' in each of these cases, as not to bias estimates upwards. This gave an additional 22 proxy responses to question (b). Combined, the median time estimate was 30 minutes, which represents a 200% increase from the estimate used in the 2016 IA.
34. Responses above the median time estimate for scoping described in paragraph 33, and for time estimates of familiarisation (see section 6.2.2) and adherence (see section 6.3.2) reason that there were levels of complexity, varieties of equipment, and numbers of duty holders in their organisations far above what was estimated in the 2016 IA, and so their business spent much more time scoping, familiarising with and adhering to EMF 2016 than was estimated in the 2016 IA, and more time than the median estimates used in this analysis. Whilst this is acknowledged, at the same time there will be smaller businesses (underrepresented in our survey responses, see section 4 for further details) with less complexity, fewer types of equipment and fewer duty holders who needed to spend less

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<sup>51</sup> The 2016 IA viewed the Ministry of Defence (MoD) as just one entity (one duty holder), and so was considered negligible, and reasoned that MRI duty holders would automatically know that they were in scope of the regulations. Therefore, neither of these sectors are included in this figure.

time than the median estimate. As described in Section 5, we assume that around 91% of businesses affected by EMF 2016 have fewer than 5 employees. We therefore use the median as an average case to be applied across all businesses within in-scope sectors, as opposed to using the mean which would be heavily influenced by larger time estimates given by more larger businesses. To summarise: although the costs to some larger businesses are higher than our estimates, there are many businesses where the costs may be lower, and so our assumptions reflect the average case. An HSE sector specialist has checked all median time estimates used in this analysis and commented that they are reasonable for a typical business.

35. Using the average cost of time of £25.80 per hour discussed in Section 5, the scoping time estimate of 30 minutes gives an average cost per business of £12.90.
36. As mentioned in Section 3, we do not reassess the sectors identified by the 2016 IA as incurring scoping costs. This is because the 2016 IA cautiously identified a very wide range of sectors (spanning around a third of all active businesses in the UK). Therefore, a significant amount of extra work would be required to confirm/reassess these sectors by consulting industry, which would be disproportionate to the change in costs that could result.
37. Using data from the ONS business demography, we estimate that the number of active businesses in these sectors in the first year of the appraisal period was around 1,020,000<sup>52 53</sup>(an increase of around 17% from the 2016 IA's estimation of 870,000). This increase in number of businesses is quite a large increase from the 2016 IA, but it does represent that the data used in this PIR is 3 years more up to date than that used in the 2016 IA.<sup>54</sup>
38. Applying the average cost to business to this number of businesses gives a present value of one-off scoping costs of approximately £13m (2015 prices, 2016 present value base year). We assume that there will be no further (ongoing) scoping costs, as any time spent by new businesses checking whether they are in scope of EMF 2016 would be negligible when considered alongside all other regulations which new businesses may need to 'scope'.

## 6.2 Familiarisation costs

39. Businesses that use equipment that emit EMFs at such levels that they need to be managed under EMF 2016 will have needed to spend time understanding the new requirements when they came into force. This is a one-off cost incurred by active in-scope businesses in the first year of the

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<sup>52</sup> As mentioned in footnote 51, the 2016 IA assumed that the Ministry of Defence (MoD) has only one duty holder and so would incur negligible costs. Research for this PIR received 13 responses from MoD, suggesting that they have more than one duty holder, with many suggesting that the time estimations in the original IA were much too low. While we acknowledge this, because the numbers of duty holders are still such a small percentage of the total number of duty holders, applying specific assumptions to this sector would have only a minimal effect on total costs. In order to apply separate assumptions for these sectors would require significant work, for example focus groups, because the number of respondents to the survey from these sectors is not sufficiently representative. Undertaking such extra work in order to produce specific estimates for these sectors would be disproportionate to any change in costs that could result. Therefore, this PIR does not estimate costs for the MoD, but we acknowledge that the cost to the MOD is greater than the estimated average cost per business.

<sup>53</sup> As mentioned in in footnote 51, the 2016 IA reasoned that the MRI sector would not incur scoping costs. However, of six MRI sector respondents to our survey, all suggested that they did spend time scoping. We acknowledge this, but including the sector in this analysis requires additional analytical resource that is disproportionate to the change in total costs that could result (the MRI sector accounts for less than 0.1% of the total number of organisations analysed in this section). We therefore acknowledge that they will incur additional costs, but do not include them in this section.

<sup>54</sup> Despite the IA using the ONS Business Demography (2014), this only provided data on businesses active in 2013. This PIR uses the ONS Business Demography (2019), which provides the number of businesses active in 2016.



appraisal period. In addition to this, any new in-scope businesses being established in each of the subsequent years of the appraisal period will also have to familiarise themselves with the regulations – this is an ongoing cost additional to the expected baseline familiarisation with regulatory requirements that new businesses must make.

40. The time spent familiarising is assumed to differ depending on the type of organisation both in the 2016 IA and in this PIR. This assumption is based on evidence collected both for the 2016 IA and for this PIR, which suggests that duty holders in sectors where EMFs pose a significant risk (i.e. telecommunications and broadcasting, energy, and MRI - hereafter referred to as 'higher-risk sectors') are already very familiar with electromagnetic fields as a workplace risk in the baseline scenario, and therefore take less time to familiarise with the regulations than duty holders in sectors where EMFs pose a lower level of risk (i.e. non-MRI health sector, welding, plastics, the MoD and the rail sector - hereafter referred to as 'lower-risk sectors').

#### 6.2.1 Original estimations from the 2016 IA

41. The 2016 IA estimated that it would take duty holders in higher-risk sectors one hour to familiarise themselves with EMF 2016; and duty holders in lower-risk sectors two hours to do the same. Using the average cost of time discussed in Section 5 of £25.80 per hour, this gives a cost per organisation of £25.80 in higher-risk sectors; and £51.61 in lower-risk sectors (2015 prices).

##### One-off Costs

42. The 2016 IA estimated that approximately 18,000 businesses in higher-risk sectors would incur this cost in the first year of the appraisal period. The 2016 IA also estimated that approximately 70,000 businesses in lower-risk sectors<sup>55</sup> would also incur this cost in the first year of the appraisal period.
43. Applying the cost per business estimates described in paragraph 41 to these figures gave first year, one-off familiarisation costs of £4.1m (2015 prices).<sup>56</sup>

##### Ongoing Costs

44. Using the methodology discussed in Section 5, the 2016 IA estimated that there would be approximately 2,300 new businesses per annum over the appraisal period in higher-risk sectors; and approximately 8,600 new businesses per annum in lower-risk sectors. As any new businesses in the first year of the appraisal period are accounted for as incurring one-off costs, these new businesses incur costs for the following nine years of the appraisal period (mid-2017 to mid-2026).
45. This gave average annual ongoing costs of approximately £500,000, and a present value of total ongoing costs of approximately £3.8m (2015 prices, 2016 present value).<sup>57</sup>

##### Total Costs

46. Taking these costs together, the 2016 IA estimated the present value of familiarisation costs over ten years to be approximately £7.8m (2015 prices, 2016 present value).

#### 6.2.2 Findings and estimations for the PIR

##### Time estimates

47. As discussed in Section 4, we have gathered new evidence on how long organisations spent familiarising themselves with EMF 2016. As part of the survey sent to the stakeholder groups described in Section 4, we asked organisations:

a) What is the main focus of your business / your employer's business?

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<sup>55</sup> The 2016 IA viewed the MOD as just one entity, and so was considered negligible and is not included in this figure

<sup>56</sup> Costs to the MRI sector were included in this estimate but were very low (around 0.03m).

<sup>57</sup> The 2016 IA actually states this estimate to be £4.0m, however we believe that this is a typing error.

48. If an organisation's answer to the question (a) was either 'Telecommunications and Broadcasting', 'Energy', or 'Health – MRI' (the broad higher-risk sectors identified in the 2016 IA), they were then asked:
- b) It was originally estimated that it would take approximately 1 hour for businesses to familiarise and understand the new EMF 2016 requirements. Based on your experience, how accurate is this estimate?
  - c) Can you please provide a general estimate of how long it took in minutes to familiarise and understand the new EMF 2016 requirements. Please provide the answer in terms of whole minutes (e.g. 45 or 90, rather than 1hr 30mins or 1.25 hours).
49. The responses to question (b) were as follows:
- i) Around 67% (16 out of 24) said that the estimate of one hour was too low or much too low
  - ii) Around 29% (7 out of 24) said that the estimate was about right
  - iii) None of the respondents said that the estimate was too high
  - iv) The remaining 4% said 'don't know' or did not answer
50. Question (c) received 14 responses in total. As was the case in section 6.1.2, respondents who answered 'about right' often did not go on to give an exact estimate of time taken. Therefore, when calculating the average response to question (c), we use a proxy response of one hour in each of these cases. Combined, the median time estimate was two hours, which represents a 100% increase from the estimate used in the 2016 IA.<sup>58</sup>
51. If an organisation's answer to question (a) was one of: 'Health – other', 'Welding', 'Plastics', 'Ministry of defence (MoD)', or 'Rail industry' (the broad lower-risk sectors identified in the 2016 IA), or 'Other (please specify)'<sup>59</sup> they were instead asked:
- d) It was originally estimated that it would take approximately 2 hours for businesses to familiarise and understand the new EMF 2016 requirements. Based on your experience, how accurate is this estimate?
  - e) Can you please provide a general estimate of how long it took in hours to familiarise and understand the new EMF 2016 requirements? Please provide the answer in terms of whole hours (e.g. 1 or 2, rather than 1hr 30mins or 1.25 hours).
52. The responses to question (d) questions were as follows:
- v) Around 61% (56 out of 92) said that the estimate of 2 hours was too low or much too low
  - vi) Around 32% (29 out of 92) said that the estimate was about right
  - vii) A very small number (1%, 1 out of 92) said that the estimate was too high
  - viii) The remaining 7% said 'don't know' or did not answer

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<sup>58</sup> See paragraph 34 for an explanation as to why the median is used to represent the 'average' case.

<sup>59</sup> The 2016 IA identifies 'Telecommunications and Broadcasting', 'Energy', and 'MRI' as the only sectors where duty holders had significant prior knowledge of EMFs as a workplace risk. Hence any respondent who received this survey, answers as though they are in scope, and does not identify with any of the sector groups mentioned is assumed to not be knowledgeable about EMF, and so is routed to the higher-time familiarisation questions. Some consultants are included in this 'other' group, who may be responding on behalf of themselves or their clients, and are included in the sample.

53. Question (e) received 55 responses in total, with an additional 29 proxy-responses of 2 hours in cases where the respondent answered 'about right' to question (d) but did not answer question (e). The median time estimate was four hours, which represents a 100% increase from the estimate used in the 2016 IA. See paragraph 34 for discussion of why the median time estimate is used in this analysis.

#### Cost estimates for higher-risk sectors

54. Using the average cost of time of £25.80 per hour discussed in Section 5, the familiarisation time estimate for higher-risk sectors of 2 hours gives an average cost per business of £51.60<sup>60</sup>.

55. As explained in paragraph 16, we do not change the broad sectors identified by the 2016 IA as being 'higher-risk' or 'lower-risk' and hence incurring these costs. Of respondents who provided an answer to question (a) (117 respondents), most (75) identified with the broad in-scope sectors defined by the 2016 IA; and a further nine were consultants (that is, businesses that may consult the organisations affected by EMF 2016). The remaining 33 responses were varied, including manufacturing, avionics, and non-destructive testing. Many of these businesses may still be captured by the 2016 IA's broad definitions of affected sectors (for example, the welding 'sector' includes various manufacturing sectors, including air and spacecraft manufacturing). Other sectors may not have been included in the 2016 IA because they are relatively small and it would require disproportionate effort to identify them and include them in the analysis; or they may not be in scope of the regulations. There were no more than four responses for each of these 'other' sectors, so extra research would need to be conducted to include them in this analysis, which would be disproportionate to the additional costs that could result.

56. Based on ONS Business demography data (see footnote 44) we estimate that approximately 22,000 businesses (excluding MRI) were active in the higher-risk sectors identified by the 2016 IA in the first year of the appraisal period – this is an update of the 18,000 businesses discussed in the original IA (see paragraph 42). These businesses would incur this one-off familiarisation cost when the regulations were introduced. Applying the average cost to business to this number of businesses gives a one-off cost of approximately £1.1m.

57. Using the cost of time for the MRI sector of £43.86 per hour and the number of MRI units of 648 (described in paragraph 25) gives an additional £0.06m one-off cost to the MRI sector.

58. This gives a one-off cost in the first year of the appraisal period of present value £1.2m (2015 prices, 2016 present value).

59. Also based on ONS business demography data (see footnote 44), we estimate the average number of births per annum over the appraisal period in these higher-risk sectors to be approximately 3,000. These new businesses will also incur the one-off familiarisation cost. This stream of new businesses will incur familiarisation costs for the following 9 years of the appraisal period (mid-2017 to mid-2026).

60. This gives average annual ongoing costs of approximately £150,000 over those 9 years, with a present value of approximately £1.2m (2015 prices, 2016 present value).

#### Cost estimates for lower-risk sectors

61. Using the average cost of time of £25.80 per hour discussed in Section 5, the familiarisation time estimate for lower-risk business of 4 hours gives an average cost per business of approximately £103.20.

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<sup>60</sup> Costs to the MRI sector are discussed in paragraph 57

62. Based on ONS Business demography data (2019), we estimate that approximately 76,000 businesses were active in the first year of the appraisal period in all lower-risk sectors<sup>61</sup> other than MoD (see footnote 52) and Health. As explained in Section 5, we use the same figure for health as in the 2016 IA: 261 non-MRI public health duty holders, and 200 private sector duty holders. This takes the total number of organisations to approximately 77,000. This is an update of the 70,000 organisations estimated in the original IA (see paragraph 42).
63. Applying the average cost to business to this number of organisations gives a one-off cost in the first year of the appraisal period of present value £7.9m (2015 prices, 2016 present value).
64. Also based on ONS business demography data (see footnote 44), we estimate the average number of births per annum over the appraisal period in these lower-risk sectors to be approximately 8,800.<sup>62</sup> These new businesses will also incur the one-off familiarisation cost. This stream of new businesses will incur familiarisation costs for the following 9 years of the appraisal period (mid-2017 to mid-2026).
65. This gives average annual ongoing costs of approximately £910,000 over those 9 years, with a present value of approximately £6.9m (2015 prices, 2016 present value).

#### Total familiarisation costs

66. Together, this gives approximately £9.1m in one-off familiarisation costs, and £1.1m of ongoing familiarisation costs per annum. This gives a total present value of familiarisation costs of £17m (2015 prices, 2016 present value).

### 6.3 Assessment of exposure levels and updating risk assessments

67. An additional requirement of EMF 2016 is that duty holders are directed to assess the levels of EMFs to which workers may be exposed against a set of specific values and update their risk assessments accordingly (see paragraphs 50-62 and 95-100 of the 2016 IA for further detail).
68. In line with current requirements<sup>63</sup>, only businesses with five or more employees need to record their exposure assessments and record the updates to their risk assessments. Those with fewer than five employees will only need to undertake the exposure assessment and update their risk assessments, but do not need to record either of these actions. Therefore, time spent on these activities varies by business size.
69. As in section 6.2, any businesses active in 2016 would have had to carry out these actions, as would any new in-scope businesses being established in each of the subsequent years of the appraisal period. Furthermore, every time a business replaces in-scope equipment, they will have to reassess exposure, record this assessment and update their risk assessment. All of these actions take time, and so are a cost to organisations.

#### 6.3.1 Original estimations from the 2016 IA

70. The 2016 IA estimated that it would take businesses with fewer than five employees 30 minutes to assess exposure levels and update their risk assessments; and businesses with five or more

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<sup>61</sup> As explained in paragraph 55, we do not change the sectors identified as 'lower-risk' by the 2016 IA

<sup>62</sup> As in the 2016 IA, we assume additional 'new' duty holders in the health sector are negligible

<sup>63</sup> See HSE guidance at: <https://www.hse.gov.uk/simple-health-safety/risk/index.htm>

employees one hour to do the same (as they must also record their exposure assessments and risk assessment updates).

71. Using the average cost of time discussed in Section 5 of £25.80 per hour, this gives a cost per organisation of £12.90 for businesses with fewer than five employees; and £25.80 for businesses with five or more employees (2015 prices).
72. The 2016 IA stated that costs to the MRI sector relating to assessment of exposure levels and updating risk assessments are nil because there is a specific disapplication for the use of MRI equipment in EMF 2016, and the sector was already aware of the level of EMFs emitted by certain equipment.

#### One-off costs

73. As explained in Section 5, the 2016 IA assumed that approximately 90% of businesses in scope of EMF 2016 (with the exception of the health sector) have fewer than 5 employees. It follows that approximately 10% of these businesses are assumed to have five or more employees.
74. The total number of businesses active in the first year of the appraisal period in all in-scope sectors other than health (see footnote 48) and MRI (see paragraph 72) was estimated by the 2016 IA to be approximately 86,000<sup>64</sup>. Using the proportions described in paragraph 73, and assuming that all 461 duty holders in the health sector would have five or more employees, gave approximately 78,000 businesses with less than five employees, and 8,900 businesses with five or more employees.
75. Applying the average costs per organisation described in paragraph 71 to these numbers of businesses gave a cost of £1.0m to organisations with fewer than five employees; and a cost of £0.23m to businesses with five or more employees. This gave a cost of assessing exposure and updating risk assessments in the first year of the appraisal period of £1.2m (2015 prices).

#### Ongoing costs

76. Using the methodology discussed in Section 5, the 2016 IA estimated that there would be approximately 1,000 new businesses per annum over the appraisal period with more than or equal to five employees; and approximately 9,700 new businesses per annum with fewer than five employees. As any new businesses in the first year of the appraisal period are accounted for as incurring one-off costs, these new businesses incur costs for the following 9 years of the appraisal period (mid-2017 to mid-2026).
77. Applying these numbers of new businesses to the average costs per business described in paragraph 71 gave average annual costs of approximately £150,000 over those 9 years, and a present value of ongoing costs of approximately £1.2m (2015 prices, 2016 present value).
78. The 2016 IA identified a further ongoing cost (which it calls 'recurring costs'), which occur because every time a business replaces equipment that emits EMFs, they will have to reassess exposure, and update their risk assessment accordingly. The 2016 IA assumed that in-scope organisations would replace their equipment once every 10 years. Given this assumption, new businesses would not need to replace their equipment any sooner than time period 11, and so any equipment replaced by these businesses are not within the appraisal period of the 2016 IA. Therefore, only businesses active in the first year of the appraisal period were estimated to incur these recurring costs.
79. The 2016 IA assumed that the replacement of equipment would be spread evenly over the appraisal period, meaning that each year 10% of businesses active in the first year of the appraisal period

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<sup>64</sup> As explained in footnote 51, the 2016 IA counted the MoD as one, negligible duty holder

would replace their equipment, reassess exposure, and update their risk assessments<sup>65</sup>. Using the numbers of businesses in the first year of the appraisal period described in paragraph 74 gives 7,800 organisations with fewer than five employees, and 890 organisations with five or more employees replacing equipment per annum.<sup>66</sup>

80. Applying these numbers of new businesses to the average costs per business described in paragraph 71 gave average annual ongoing costs of approximately £120,000 over 10 years, and a present value of ongoing costs of approximately £1.1m (2015 prices, 2016 present value).

#### Total Costs

81. Taking these costs together, the 2016 IA estimated the present value of costs of assessing exposure and updating risk assessments over ten years to be approximately £3.5m (2015 prices, 2016 present value).

### 6.3.2 Findings and estimations for the PIR

#### Time and replacement rate estimates

82. As discussed in Section 4, we have gathered new evidence on how long organisations spent assessing exposure levels and updating risk assessments. As part of the survey sent to the stakeholder groups described in section 4, we asked organisations:
- a) How many people work in your organisation?
83. If an organisation's answer to question (a) was more than or equal to five employees, they were then asked:
- b) It was originally estimated that it would take approximately 1 hour for businesses to undertake an EMF exposure assessment, record the findings and update the necessary risk assessment(s). Based on your experience, how accurate is this estimate?
  - c) Can you please provide a general estimate of how long it took in minutes to undertake an EMF exposure assessment, record the findings and update the necessary risk assessment(s). Please provide the answer in terms of whole minutes (e.g. 45 or 90, rather than 1hr 30mins or 1.25 hours).
84. The responses to question (b)) questions were as follows:
- i) Around 80% (86 out of 108) said that the estimate of 1 hour was too low or much too low
  - ii) Around 14% (15 out of 108) said that the estimate was about right
  - iii) One respondent said that the estimate was too high
  - iv) The remaining 6% said 'don't know' or did not answer
85. Question (c) received 85 responses in total. As was the case in section 6.1.2, respondents who answered 'about right' often did not go on to give an exact estimate of time taken. Therefore, when calculating the average response to question (c), we use a proxy response of one hour in each of

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<sup>65</sup> The 2016 IA acknowledged that some businesses active in the first year of the appraisal period may cease to exist before incurring this cost. As a simplifying assumption, the 2016 IA assumed that all businesses active in the first year of the appraisal period would remain in operation to incur this cost.

<sup>66</sup> Note that replacement costs commence in year zero because there could be businesses that comply with the regulations on them coming into force, but will then later in that year replace their equipment and so have to re-assess exposure

these cases. This gave an additional 14 proxy responses to question (c). Combined, the median time estimate was four hours, which represents a 300% increase from the estimate used in the 2016 IA.<sup>67</sup>

86. As mentioned in paragraph 72, the 2016 IA stated that the MRI sector would not incur additional costs from assessing exposure and updating risk assessments. However, of six MRI sector respondents to the survey all suggested that they did spend time on these activities. We acknowledge this, but including the sector in this analysis requires additional analytical resource which is disproportionate to the change in total costs that could result. MRI duty holders make up less than 1% of all duty holders in this analysis, and as seen in section 6.2, total cost estimates are not sensitive to this sector's costs. We therefore acknowledge that the MRI sector has incurred additional costs, but do not make specific estimates in the analysis that follows.
87. If an organisation's answer the question (a) was that it has fewer than 5 employees, they were instead asked:
- d) It was originally estimated that it would take approximately 30 minutes for businesses to undertake an EMF exposure assessment and update the necessary risk assessment(s). Based on your experience, how accurate is this estimate?
  - e) Can you please provide a general estimate of how long it took in minutes to undertake an EMF exposure assessment and update the necessary risk assessment(s)? Please provide the answer in terms of whole minutes (e.g. 60 or 90 minutes, rather than 1hr 30mins or 1.25 hours).
88. Only six responses to question (d) were received, all of whom said that the estimate of 30 minutes was too low or much too low. Question (e) received six responses in total. The median time estimate was 3 hours, which represents a 500% increase from the estimate used in the 2016 IA. See paragraph 34 for discussion of why the median time estimate is used in this analysis.
89. This sample size is clearly very low. As explained in Section 4, we attempted to gather additional data for this business demographic through multiple channels, which did not increase the sample size. Furthermore, three of the six responses to question (e) are consultants who have fewer than five employees. These may be consultants who use equipment which emit EMFs themselves, or consultants responding on behalf of clients who have fewer than five employees. In either of these cases, the consultants give an estimation of how long it takes to undertake EMF exposure assessments and update the necessary risk assessments for businesses with fewer than five employees (i.e. the amount of time we are trying to estimate by asking this question). However, they may also be responding on behalf of businesses with five or more employees. In this case, their responses may be an overestimate (as explained earlier, businesses who have five or more employees are expected to take longer to assess exposure and update risk assessments than businesses with fewer than five employees). Indeed, removing the three consultant's answers from our sample gives a much lower median time estimate of one hour. We take a prudent approach by leaving these consultants in our sample, in order to potentially overestimate costs rather than risk potentially underestimate them, which is especially important given the uncertainty presented by our low sample size.
90. Finally, in order to re-estimate how often businesses replace equipment, we asked businesses:
- f) It was originally estimated that equipment which emits EMFs will be replaced, on average, every 10 years. Based on your experience, how accurate is this estimate?

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<sup>67</sup> See paragraph 34 for an explanation as to why the median is used to represent the 'average' case.

g) Can you please provide a general estimate of how long in years, on average, equipment which emits EMFs will be replaced? Please provide the answer in terms of whole years (e.g. 12 or 20, rather than 10.5 years or 15-17 years).

91. The responses to question (f) questions were as follows:

- i) Around 37% (42 out of 113) said that the estimate of 10 years was too low or much too low
- ii) Around 29% (33 out of 113) said that the estimate was about right
- iii) Around 9% (10 out of 113) said that the estimate was too high or much too high
- iv) The remaining 25% said 'don't know' or did not answer

92. Question (g) received 51 responses in total, with an additional 33 proxy-responses of 10 years in cases where the respondent answered 'about right' to question (d) but did not answer question (e). The median estimate was 10 years, which is the same as that used in the 2016 IA. See paragraph 34 for discussion of why the median time estimate is used in this analysis.

#### One-off Costs

93. Using the average cost of time discussed in Section 5 of £25.80 per hour, and the median time estimates described in paragraphs 85 and 88 gives a cost per organisation of £77.40 for businesses with fewer than five employees; and £103.20 for businesses with five or more employees (2015 prices).

94. As explained in Section 5, we assume that approximately 91% of businesses in scope of EMF 2016 (with the exception of the health sector) have fewer than five employees. It follows that approximately 9% of these businesses have five or more employees.

95. Using the ONS business demography, we estimate that the total number of businesses active in the first year of the appraisal period in all in-scope sectors other than MoD<sup>68</sup>, health (see footnote 48) and MRI (see paragraph 86) was approximately 98,000. Using the proportions described in paragraph 94, and assuming that all 461 duty holders in the health sector have 5 or more employees gave approximately 89,000 businesses with less than five employees, and 9,700 businesses with five or more employees.

96. Applying the average costs per organisation described in paragraph 93 to these numbers of businesses gives a cost of £6.9m to organisations with fewer than five employees and a cost of £1.0m to businesses with five or more employees. This gives a cost of assessing exposure updating the risk assessments in the first year of the appraisal period of £7.9m (2015 prices).

#### Ongoing Costs

97. Using data from the ONS business demography, we estimate that there was an average of approximately 12,000 business births per annum in all in scope sectors over the period 2016-2019. As explained in Section 5, we assume this to be the number of business births per annum over the appraisal period. Applying the proportions described in paragraph 94 gives approximately 1,100 new businesses per annum over the appraisal period with five or more employees, and approximately 11,000 new businesses per annum with fewer than five employees. As any new businesses in the first year of the appraisal period are accounted for as incurring one-off costs, these new businesses incur costs for the following 9 years of the appraisal period (mid-2017 to mid-2026).

98. Applying these numbers of new businesses to the average costs per business described in paragraph 93 gave average annual ongoing costs of approximately £940,000, and a present value of ongoing costs of approximately £7.1m (2015 prices, 2016 present value).

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<sup>68</sup> As explained in footnote 52, we do not attempt to estimate the number of duty holders in MoD on grounds of proportionality.



99. As described in paragraph 92, we estimate that businesses will replace equipment which emits EMFs, on average, every ten years (the same estimate as in the 2016 IA). We assume, as in the 2016 IA, that replacement is spread evenly over the appraisal period, meaning that each year 10% of businesses active in the first year of the appraisal period would replace their equipment, reassess exposure, and update their risk assessments<sup>69</sup>. Using the numbers of businesses in the first year of the appraisal period described in paragraph 95 gives approximately 8,900 organisations with fewer than five employees; and 970 organisations with five or more employees replacing equipment per annum.<sup>70</sup>
100. Applying these numbers of new businesses to the average costs per business described in paragraph 93 gave average annual ongoing costs of approximately £790,000, and a present value of ongoing costs of approximately £6.8m (2015 prices, 2016 present value).

#### Total Costs

101. Taking these costs together, we estimate the present value of costs of assessing exposure and updating risk assessments over ten years to be approximately £22m (2015 prices, 2016 present value).

## 7. Benefits

102. In the 2016 IA, it was noted that no key stakeholders or sectors identified any direct benefits in advance of the implementation of EMF 2016. This was because stakeholders felt that risks were already being managed under existing health and safety legislation. It was felt at the time that there could be an indirect benefit of the specific legislation, with duty holders able to refer to EMF 2016 to be able to explain and justify the necessary requirement to control risks properly. It was also suggested that the existence of the Regulations would help to give the issue publicity and increase awareness that EMFs can pose some hazards in some situations. It was also thought that EMF 2016 would provide a uniform set of values written in law, updating the status from that of guidelines which the industry had been working with for many years.
103. As part of this PIR, in the survey of duty holders, question 24 asked if there had been any benefits as part of the EMF 2016 changes. There were 75 responses to this question. A majority of these respondents (70%) identified some benefits of EMF 2016. The most common benefit cited (by almost a third of respondents) is that EMF 2016 has increased awareness of the risks of EMFs for workers. An almost equal number of respondents said there had been no benefits of EMF 2016. Just under 20% of respondents did identify a benefit in terms of providing staff safety and reassurance. Other benefits cited by respondents include greater regulatory clarity, proving compliance, improved control and better equipment. Furthermore, when asked whether the risks arising from EMFs can be controlled using existing health and safety legislation (i.e. there is not a need for EMF 2016), most respondents (52%) disagreed, and 29% agreed (see the Evidence Review for further detail). This, together with the benefits stated by respondents, suggests that there may have been health and safety benefits of EMF 2016 beyond what was anticipated in the 2016 IA.
104. Although it is clear from the survey that many respondents feel that there have been some benefits of EMF 2016, it would be disproportionate to attempt to quantify these benefits in monetary terms

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<sup>69</sup> We acknowledge that some businesses active in the first year of the appraisal period may cease to exist before incurring this cost. As a simplifying assumption, we assume that all businesses active in the first year of the appraisal period will remain in operation to incur this cost, likely serving to overestimate these costs.

<sup>70</sup> Note that replacement costs commence in year zero because there could be businesses that comply with the regulations on them coming into force, but will then later in that year replace their equipment and so have to re-assess exposure

as the benefits are about complex behaviour change which is not something that is readily translated to market prices. Furthermore, the health and safety benefits described above may not be additional to what was already legally required in the baseline scenario (described in paragraph 14). The regulations present under the baseline scenario require employers to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all their employees. Therefore, the benefits described may have arisen because EMF 2016 encourages compliance with duties that organisations should have already been undertaking under the baseline scenario (for example, by raising awareness of risks/ being more explicit about appropriate steps to take).

## 8. Summary

105. In summary, this analysis has looked at the impacts to duty holders of the implementation of EMF 2016. We have tested the three main cost categories identified in the 2016 IA using surveys of businesses and updated data sources.
106. Table 2 below provides the estimate of each cost category according to the 2016 IA and the re-estimated costs in this CBA (all in 2015 prices, 2016 present value). As previously discussed, as well as updating the time estimates for compliance activities, this analysis has also updated assumptions around numbers of duty holders, holding prices constant between the 2016 IA and this PIR.

**Table 2: Summary of Costs and Benefits (£millions, 2015 prices, 2016 present value base year)**

Cost category	Equivalent annual costs <sup>a</sup>	
	The 2016 IA	Revised PIR estimates
Scoping costs	0.4	1.5
Familiarisation	0.9	2.0
Assessing exposure and updating risk assessment	0.4	2.5
<b>Total</b>	<b>1.7</b>	<b>6.0</b>

a: The equivalent annual cost is the constant annual cost over the appraisal period which gives the same net present value as is calculated using actual costs. This provides a common metric to compare costs from different interventions with different lengths of appraisal period. Costs to the public sector (MRI and a percentage of the health sector) do not affect these rounded figures, and so these figures also represent the EANDCB. Components of the equivalent annual costs for the 2016 IA are presented here rounded to one decimal place for this purpose, for ease of presentation. The 2016 IA estimated its final EANDCB figure in 2014 prices, 2015 present value for the purposes of the Business Impact Target. We present it here in 2015 prices, 2016 present value for simplicity and ease of comparison. This change does not affect the rounded total EANDCB figure of £1.7m.

107. The revised estimate of costs based on the analysis set out in this report suggests an NPV of total costs over the 10-year appraisal period of £52m (2015 prices, 2016 present value). The 2016 IA originally estimated the NPV of the total costs over 10 years to be £15m (2015 prices, 2016 present value). Costs to the public sector are so small they do not affect these rounded figures.
108. Costs to the public sector estimated in this CBA (i.e. costs to MRI sector duty holders and 261 NHS trusts in the health sector) have an NPV over the 10-year appraisal period of approximately £140,000. As in the 2016 IA, these costs make up a very small proportion of total estimated costs. We acknowledge that costs to the public sector are likely to be higher than we estimate, for multiple reasons:

- As discussed in footnote 52, we do not make specific cost estimates for the MoD on grounds of proportionality.
- As discussed in footnote 53 and paragraph 86, we do not make specific cost estimates for the MRI sector in some cost areas on grounds of proportionality.
- As discussed in paragraphs 25 and 26, we do not update some data sources for the MRI and Health sectors on grounds of proportionality.
- There may be some public bodies operating in sectors which we have analysed other than MRI, Health and MoD. As in the 2016 IA, we assume that these public bodies will make up a very small proportion of total businesses analysed. The additional analytical resource required to make specific cost estimates for these public bodies would therefore be disproportionate to the change in total (public plus private) costs that could result.

109. The revised estimate of costs based on the analysis set out in this report suggests that the equivalent annual net direct cost to business (EANDCB) of EMF 2016 is **£6.0million** (2015 prices, 2016 present value). The 2016 IA originally estimated the EANDCB of the EMF Regulations to be £1.7m (2014 prices, 2015 present value).<sup>71</sup>
110. The NPV of total costs and the EANDCB have increased by approximately 250% compared with the 2016 IA. The change is largely driven by the increased estimates of the time to comply with EMF 2016, as informed to us via the survey described in Section 4. A summary of how the estimated time to comply has changed for each cost component is in Table 3.

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<sup>71</sup> The 2016 IA estimated its final EANDCB figure in 2014 prices, 2015 present value for the purposes of the Business Impact Target. This rounded figure of £1.7m does not change when updated to 2015 prices, 2016 present value.

**Table 3 – Estimated average time taken to comply with EMF 2016**

<b>Cost category</b>	<b>(A) Time estimates from the 2016 IA</b>	<b>(B) Estimated time based on survey data for this PIR</b>
<b>Scoping time</b>	10 minutes	30 minutes
<b>Familiarisation – higher-risk</b>	1 hour	2 hours
<b>Familiarisation – lower-risk</b>	2 hours	4 hours
<b>Risk assessment and exposure (&lt;5 employees)</b>	30 minutes	3 hours
<b>Risk assessment and exposure (&gt;5 employees)</b>	1 hour	4 hours
<b>Average replacement period for EMF-emitting equipment</b>	10 years	10 years

111. We estimate that updating all assumptions other than the time estimates described in Table 3 (for example, the number of duty holders incurring costs) would only increase costs by approximately 12% compared to the 2016 IA. Further updating for the time estimate increases described in Table 3 accounts for the remaining increase in costs (approximately a further 230% increase in costs compared to the 2016 IA).
112. Although costs have increased by approximately 250%, it is important to note that total costs and the EANDCB have remained in the same order of magnitude as the 2016 IA. Furthermore, similar to the rationale described in paragraph 104, some costs may not be additional to what organisations should have already been doing under the baseline scenario described in paragraph 14. The regulations present under the baseline scenario require employers to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all their employees. Many businesses may have already needed to familiarise themselves with risks arising from EMFs, assess exposure, and assess risks in order to adhere to this requirement. More thorough, in depth discussions with duty holders would be needed to improve certainty around the additional cost estimates, but this would be disproportionate to the PIR.
113. The Green Book (see footnote 45) details an expectation for analyses to consider "the potential for significant differential place based impacts". We have analysed the geographical distribution of businesses incurring costs as a result of EMF 2016 using data from the ONS<sup>72</sup>. Affected businesses are spread relatively evenly across different regions within GB. More in-depth place-based analysis is

<sup>72</sup> UK business: activity, size and location 2020 – Office for National Statistics, available at: <https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation>

deemed disproportionate considering the level of costs estimated in this PIR, and this initial analysis not showing a significantly uneven spread of costs.

114. It is our view that the analysis performed for this CBA has been proportionate to the scale of the impacts associated with EMF 2016 and no further analysis is proposed.