



Voluntary Carbon Standard Project Description Template

9 March 2009
Version 2

1 Description of Project:

1.1 Project title

Conversion of SF₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON

1.2 Type/Category of the project

- *Project category which is part of a GHG program that has been approved by the VCS Board.*
- *Specify here if the project is a Grouped project*

This project is using an approved CDM Methodology, AM0065 – Replacement of SF₆ for Use as a Cover Gas in Magnesium Production, Version 1

This project is a grouped project because it contains two sites.

This project covers CDM Sectoral scopes 04, 09 and 11

1.3 Estimated amount of emission reductions over the crediting period including project size:

Please indicate the chosen crediting period and provide the total estimation of emission reductions as well as annual estimates for the chosen crediting period. Information on the emission reductions shall be indicated using the following tabular format.	
Year	Annual estimation of emission reductions in tons of CO ₂ e (Short tons)
2007	100,720
2008	346,202

2009	361,114
2010	361,114
2011	361,114
2012	361,114
2013	361,114
2014	361,114
2015	361,114
2016	361,114
Total estimated reductions (tonnes of CO₂e)	3,335,835
Total number of crediting years	10 years

1.4 A brief description of the project:

Because molten magnesium burns in the presence of oxygen, production and casting of magnesium metal requires a protection system to prevent this oxidation. Among the various protection systems commonly used are those that use gaseous components with high GWP values, such as SF₆, which typically escape to the atmosphere.¹ SF₆, because it is such a non-reactive gas, is ideally suited for this kind of protection as a “covering” for molten magnesium (hence the term “cover gas”).

Meridian Magnesium Products currently uses SF₆ as a protective cover gas to prevent oxidation of its molten magnesium. The proposed project will switch over from SF₆ to Novec-612, a recently-patented gas by 3M, which has never been used commercially in the US, as well as SO₂. The SO₂ will perform the same function as the SF₆, as a cover gas to prevent the metal from reacting with the air. The SO₂ gas will be pumped from a gas mixer, in very low concentrations, to the point-of-use and inserted over the melt surface. The purpose of the project activity is to stop using the SF₆ and instead use a cover gas that has no global warming potential, thus reducing GHG emissions to the atmosphere. The recycling operation will use SO₂ and the die casting operation will use Novec. The reason for this is because during the trials, the recycling plant had quality issues with the use of Novec, which was not a problem for SO₂.

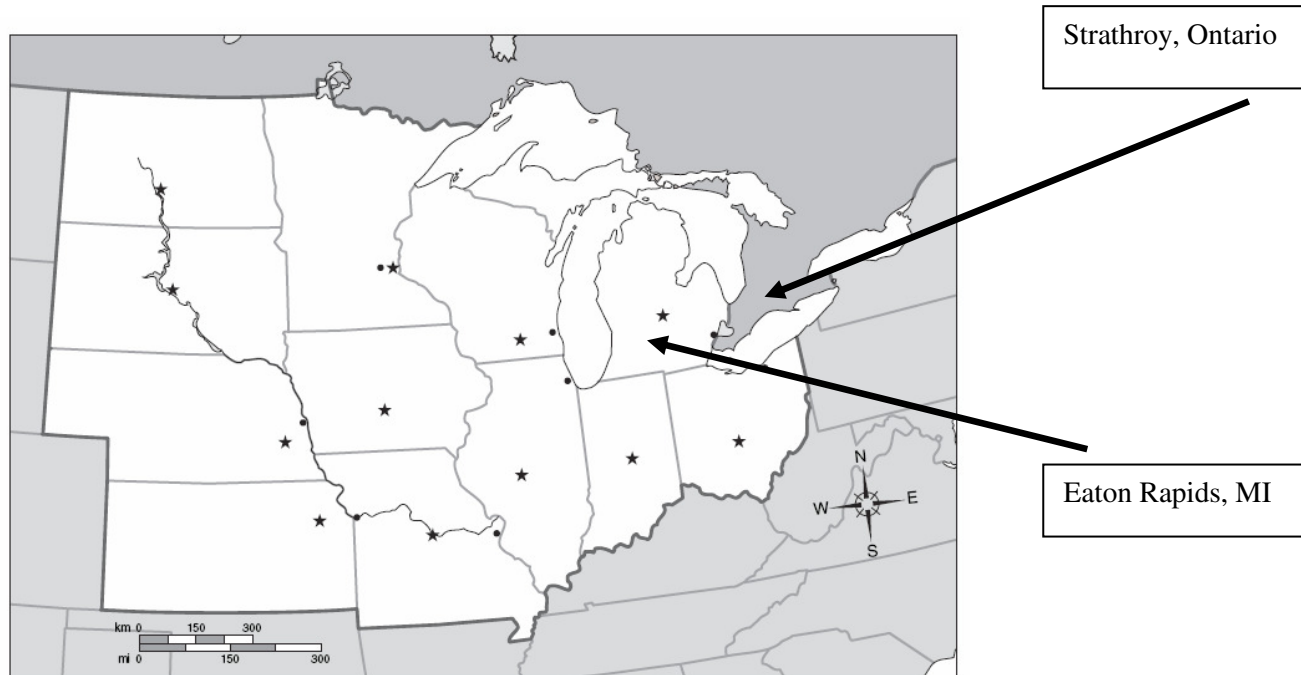
¹ 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 3, Chapter 4, page 4.57)

1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:

Site 1: Meridian Magnesium Products of America
2001 Industrial Drive
Eaton Rapids, Michigan, U.S.A. 48827

Site 2: Magnesium Products Division (MPD)
155 High St. East
Strathroy, Ontario N7G 1H4
Canada

	Longitude	Latitude
Eaton Rapids	42° 31' N	84° 38' W
Strathroy	42° 59' N	81° 62' W



The Michigan plant has the following characteristics:

- 360 employees
- 13,140 Net Metric Tons
- Plant Size 208,000 ft² (13,800 m²)
- 15 Die cast cells
 - 2 - 800 ton
 - 4 - 1200 ton
 - 1 - 2500 ton

- 8 - 3000 ton
- Secondary Operations
 - 9 CNC machining centers
 - 2 Tri-Way machining centers
 - Special purpose drill centers
 - Special purpose machines and assembly equipment
 - Automated assembly equipment
 - Automated vision inspection stations for instrument panel assembly and Magnesium Radiator Support programs
 - Leak test equipment
 - Paint line for Magnesium Radiator Support program

The Ontario plant has the following characteristics:

- 16,000 Net Metric Tons
- 408 employees
- Plant Size 229,000 ft² (21274m²)
- **21 Die cast cells**
 - 4 - 800 ton
 - 8 - 1200 ton
 - 7 - 1600 ton
 - 2 - 2500 ton

Secondary Operations

- 12 dedicated machining and assembly operations
- Automated Vision Inspector for IP's
- In-House Recycling Operation

1.6 Duration of the project activity/crediting period:

Project Start Date: The project start date is considered to be the date in January, 2007 when Meridian Magnesium signed a contract with QualityTonnes, LLC (which later was acquired by Climate Change Capital) to provide all services related to monetizing the potential VERs from its US projects. This included the submission of a CDM methodology (later to become AM0065) to the CDM Executive Board. A copy of this contract is attached.

Crediting Period Sought: 10 years, starting January 1, 2007

1.7 Conditions prior to project initiation:

Before the project was initiated, SF₆ was the sole cover gas used to protect magnesium from reaction with oxygen. Thus, the GHG emissions were taking place with no consideration or use of alternative gases. The Canadian plant started operation in 1981 and the US plant started in 1993.

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

The current situation is the use of SF₆, the vast majority of which is simply emitted to the atmosphere. By using alternative cover gases, SF₆ will no longer be used, hence avoiding the emissions of SF₆. In its place, SO₂ and Novec will be used. The gases will be pumped from a gas mixing station in the plant through a piping system to the points-of-use – the die cast furnaces and recycling operations – and inserted above the melt surface, so the molten metal does not react with the air. The gas will be stored in the gas mixing station in storage tanks (located in the cabinets) until the gas is required for use at the die cast cells or recycling furnaces. At the gas mixing stations, the Novec and SO₂ are mixed with a carrier gas – in this case CO₂ – for delivery to the points-of-use. In the case of Novec, the gas is first a liquid, which is stored in a large container next to the mixing stations. The liquid is pumped into the station where the pressure is reduced to the point it becomes a gas and mixed in with the carrier gas.

1.9 Project technologies, products, services and the expected level of activity:

This project will install the necessary piping and other equipment required to switch from SF₆ to Novec-612 and SO₂. Novec-612 is a recently-patented gas by 3M. The gas is a fluorinated ketone with the chemical formula C₂F₅COC₃F₇.

Environmental Properties	SF₆	SO₂	HFC-134a	Novec™ 612 Agent
Ozone depletion Potential (ODP)	0	0	0	0
Atmospheric Lifetime (years)	3200		140	0.014
Global Warming Potential (GWP)	22,200	1	1300	1

1.10 Compliance with relevant local laws and regulations related to the project:

This project complies with all local laws and regulations. There is currently no regulation dealing with the emissions of SO₂ in Michigan because the amounts are so small. In Canada, Meridian does have a permit to emit SO₂ and it is compliance with that permit. The levels of SO₂ are also in compliance with AM0065, such as concentration levels being 1% or less, emissions being less than 1,470 mg/m³.

1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:

Demand Risk: Meridian's sales are highly geared to the big three auto manufacturers. The current breakdown is GM 36%, Ford 31% and Chrysler 15%. This naturally leaves them exposed to both the fortunes of these companies but also to internal decisions of one or two clients. Meridian is mitigating the first of these risks by focusing their expansion into Asia and Europe (this is evidenced by successfully operating plants in England, Italy and China). The second risk is managed by the inherent symbiotic and integrated relationship between auto manufacturer and auto supplier where close collaboration allows Meridian to adapt where possible to fit the demands of its customers. The risk to Meridian's sales is also countered by the growing presence of Magnesium within the auto sector.

Supply Risk: Approximately 80% of raw magnesium supply comes from China and Mg ore is a key cost for Meridian. The company have protected themselves from temporary oscillations in magnesium prices by ensuring that 75% of their demand contracts have raw material price pass-through clauses. They also have long term magnesium supply contracts with both independent suppliers and their main clients (GM can buy high quantities of Magnesium at lower than spot prices). These contracts will be renegotiated but at present they last to 2009. Meridian also operates a highly efficient manufacturing process, recycling up to 50% of the volume that is passed through the plant (MPA).

Generation of VERs from these Projects depend upon Meridian continuing to operate Magnesium plants: The delivery of the VERs is directly correlated to the production volumes of the magnesium plants. The VER production process is therefore dependent on Meridian continuing its normal operations such that Meridian can project manage the technical, commercial and financial support required for the development of its projects. If, for any reason, Meridian operations are compromised, due to, for example, technical, financial, regulatory or management failure, or significant reduction in order volumes from its customers, then Meridian may not be able to produce and deliver all of the VERs as required under the ERPA's.

Operational Risk: The SF6 abatement technology (Novec-612) to be utilised by the Project is a new and unproven technology in the US. To manage the risk of the technology failing (and so the VERs not being produced) Meridian have been working very closely with the manufacturer (3M) to pre-test the application, use and efficiency of both the gas and the process required to administer it. SF6 has been used for many years and a failure to replicate its effect would be highly expensive to Meridian. The company recently finished the final test on Novec-612's operation and found no material problems.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

SF6 has been used at this magnesium plant since its commissioning (as demonstrated by a graph documenting previous SF6 use prior to the baseline years – this graph was

previously sent to DNV. Thus, it can be stated that the use of SF6 was not undertaken simply to stop the use of the gas and generate carbon credits.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).

This project is not creating any renewable energy or any other useful energy product. It is simply avoiding the use and emissions of SF6. Thus, no other form of environmental credit is being created.

1.14 Project rejected under other GHG programs (if applicable): This project has not been rejected by any other GHG program

1.15 Project participants / roles and responsibilities, including contact information of the project proponent, other project participants:

Name of Party Involved	Private or Public Entities	Indicate if the Party wishes to be considered a project participant (Yes/No)
Government of United States	☒ Meridian Magnesium Products	No
Government of Canada (Hosts)	☒ Climate Change Capital	No
No Annex 1 Party yet identified		

Chuck Woodburn
Facilities Engineer
Meridian Magnesium
Email: cwoodburn@meridian-mag.com
Telephone: +1 517-663-2700

Responsibilities: Overall project management, including all technical aspects, carrying out all monitoring and data collection

Seth Baruch
Carbon Markets, US
Climate Change Capital Limited
Email: sbaruch@c-c-capital.com
Telephone: +1 202 236 5253

Responsibilities: Drafting methodology for baseline and monitoring; assistance to Meridian for all methodological aspects surrounding the project including satisfying all VCS and/or CDM guidelines and requirements; assisting with validation and verification

1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.):

The only fact that might be relevant here is that there is no requirement, either local or federal, that requires the limitation or elimination of SF6. Meridian's choice to stop using SF6 is not the result of any legal or regulatory mandate. There is no conflict with any social or environmental regulations as the alternative gases, Novec and SO2, either have no environmental impacts or the use is so small (SO2) that no additional permitting or regulatory approvals has been necessary.

1.17 List of commercially sensitive information (if applicable):

Any commercially sensitive information that has been excluded from the public version of the VCS PD that will be displayed on the VCS Project Database shall be listed by the project proponent.

N/A

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:

Projects shall use one of the VCS program approved project methodologies and provide information relevant to methodology deviations or methodology revisions.

This project uses a CDM-approved methodology, AM0065, Version 1: “*Replacement of SF6 with alternate cover gas in the magnesium industry*”

2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

This project is applicable to this methodology because the following applicability criteria – listed in AM0065 – apply to this project:

1. The **magnesium metal casting industry**, for the purposes of this methodology, is defined as being included in one or more of the following industry segments:

- Primary ingot casting (includes alloying furnaces, does not refer to primary magnesium production from metallic magnesium such as electrolysis or thermal reduction processes);
- Die casting;
- Gravity casting;
- Production of secondary magnesium through recycling of magnesium or its alloys;
- A cover gas is an inert gas used to avoid oxidation of molten magnesium in casting and alloying processes.

This project covers both die-casting and recycling and are thus eligible under AM0065

2. Advanced “dilute SO2” melt protection technology is technology that meets the following specifications:

- Well controlled SO2 concentration and flow rates with concentration typically 1 percent or less. The concentration is approximately 1%.

An associated SO₂ exhausting and abatement system to ensure SO₂ emissions are in compliance with the local environmental regulations. Emissions from the facility to the ambient air should comply with the local standards of the country. If no local standards exist, the following value should be taken into account as a cap limit for SO₂ concentration in the exhausting system – 1470 mg/m₃ (dry basis, 273 K, 101,325 kPa at an oxygen concentration of 6 % (v/v)); There is no local law dealing with SO₂ emissions in Michigan because the amounts emitted are so small. In Canada, Meridian does have a permit to emit SO₂, with which the company is in compliance.

- Precise gas mixing and delivery system using mass flow controllers (MFC) or similarly accurate device and heated gas lines to SO₂;
- Gas cabinet with leak monitors and emergency ventilation system.
- Redundant / back-up melt protection technology in case SO₂ leak requires system shut-down and repair;
- Emergency response plan, training, and personal safety equipment;
- Back-up generator for gas mixing system and necessary controls, compressors, etc. – capable of running independently for 12 hours;
- Maintenance plan for equipment and gas distribution system to assure safe and consistent operation.

The portions of the Meridian project that will include SO₂ use meet all of the above criteria.

3. This methodology applies to project activities that replace the use of cover gas SF₆ in full or in part by another cover gas, HFC134a, Perfluoro-2-methyl-3-pentanone (CF₃CF₂C(O)CF(CF₃)₂) or SO₂ using lean SO₂ technology, **in existing facilities:**

This project will replace SF₆ with SO₂ and Novec and was implemented in 2007-2008: (CF₃CF₂C(O)CF(CF₃)₂)

4. The methodology is only applicable if the baseline scenario is the continuation of current practice of using SF₆ as a cover gas

2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

	Source	Gas	Included?	Justification / Explanation
Baseline	Cover gas mix to protect molten magnesium	CO ₂	Yes	CO ₂ was used as a carrier gas for SF ₆ in the baseline
		SF ₆	Yes	This is the primary gas, which will be substituted in the project scenario.
Project Activity	Inserted as cover gas mix to protect molten magnesium	CO ₂	Yes	CO ₂ is used as a carrier gas for the Novec
		SF ₆	Yes	In cases where SF ₆ is used in the project scenario, it is included in project emission calculations and monitored data.

	By-product of reaction between cover gas mix and molten magnesium	CH ₄ C ₂ F ₆ C ₃ F ₈	Yes	Accounted for through the calculation of project emissions. This source will be taken into account since this project is using Novec or Perfluoro-2-methyl-3-pentanone.
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For this project, the project boundary are the two facilities from which SF₆ was used in the baseline and from which the by-products of Novec are emitted in the project scenario.

2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

Identification of the baseline scenario: To begin identifying the baseline scenario, the project participants have undertaken the following steps:

Step 1. Define alternative scenarios to the proposed project activity: In this project, the following scenarios are possible:

- (a) Advanced “dilute SO₂” melt protection technology without the use of carbon credits.
- (b) SF₆- continuation of current practice;
- (c) HFC134a without the use of carbon credits.
- (d) Perfluoro-2-methyl-3-pentanone (Novec 612) without the use of carbon credits.
- (e) SF₆ capture and reuse;
- (f) Process modifications / optimizations to minimize SF₆ consumption.

Step 2. Barrier analysis

For each scenario, the following analysis can be provided

(a) Advanced “dilute SO₂” melt protection technology without the use of carbon credits. This is a possible scenario, however, SO₂ is a harmful gas, and the use of SO₂ requires much greater care in terms of protective equipment and additional training costs. Personnel have to be trained in careful handling when SO₂ is present and both monitoring equipment, masks and other protective gear are required – all representing additional costs. In addition, conversion to SO₂ requires large capital expenses in terms of re-piping and other equipment replacements. While these are one-time capital costs, the additional protections required of the personnel represent higher annual operating costs. One issue to note is that SO₂ is cheaper than SF₆, which might provide an economic incentive to use SO₂. However those savings are more than exceeded by the one-time capital costs of SO₂ and the on-going, annual cost required to protect workers from the exposure to SO₂. Further analysis is

provided below. This is particularly the case when considering the strict conditions listed in AM0065 under which SO₂ could be used.

(b) SF₆- continuation of current practice. As described in the additionality and baseline selection section, this is the most plausible baseline scenario.

(c) HFC134a without the use of carbon credits. This would be eligible as a project activity under AM0065, but it faces many of the same barriers described below in the additionality section (such as no law requiring switch from SF₆, as well as higher costs. In the end, Meridian decided against HFC 134-a because of regulatory concerns. For example, HFC-134a has been banned in the US for use in certain applications. Thus, Meridian felt there was a potential risk for using this gas in their facilities. The potential for such a ban will take place in US during the project period is quite low, but Meridian feels using Novec instead of HFC-134a represents a lower regulatory risk.

(d) Perfluoro-2-methyl-3-pentanone (Novec 612) without the use of carbon credits. This is a possible scenario except that the cost of the gas is so much greater than SF₆ (more than three times greater), that without the potential for earning carbon revenues, this option will not be feasible. More analysis is provided below. Novec is also a totally new gas, never used commercially in the US before. As such, there is hesitation on the part of facility managers to use such a new alternative when the effectiveness of SF₆ has been known and understood for so long. The use of Novec by Meridian required extensive trials under every operating condition, and this upfront cost – coupled with the higher cost of the gas itself – was a major disincentive for using Novec without selling the VERs from the project to Climate Change Capital.

(e) SF₆ capture and reuse. Capturing SF₆ is extremely difficult given the temperatures and other environmental conditions involved in the pots themselves. The gas can also be contaminated by some by products, such as HF. The cost of recycling and the required treatment of the gas in order to reuse it would be much higher than the savings from reduced SF₆ purchases.

(f) Process modifications / optimizations to minimize SF₆ consumption. This may have been a viable option, but the plant has already been optimized, so this is included in the baseline. According to Meridian, optimization improvements has reduced “SF₆ intensity” by an estimated 80% as its US and Canadian facilities. For example, pulse timers were installed to reduce SF₆ flow when machines are not running at capacity. These pulse timers, for example, turn off SF₆ delivery for 15 seconds each minute when the machines are running at full steam. When the machines are not running as much, the cycling goes from 45 seconds off, 15 seconds on. In addition, the flow meters have been orificed, which reduces the potential of SF₆ leakage. With these and other measures, the use of SF₆ has been much more efficient. As part of its ISO14001 targets, SF₆ use in its US plant was reduced by 80% -- from 28 bottles per month to 8. As a result, there is virtually no room left for optimization improvements in both the US facility. The current baseline emissions figure represents these already-implemented improvements. Additional data can be provided upon project validation.

Step 3. Investment Analysis

Given the information above, the only real alternatives would be the use of Novec or SO₂ without carbon credits, in order to *completely eliminate* the emissions of SF₆. Thus, there is no need to do an investment analysis on any scenario other than this scenario and the baseline – the continuation of SF₆. Thus, the alternatives eliminated from the investment analysis are (C), (E) and (F).

To demonstrate the need of carbon credits in order to make such a switchover financially viable, the following investment analysis can be provided:

In 2006, Meridian Magnesium paid about US\$8.11 per pound of SF₆. As far as usage of the alternative cover gases, Meridian has conducted trials of SO₂ and Novec in its plant in the US and Canada. In the trials, it was discovered that about the same amount of SO₂ was required as SF₆ to provide the equivalent melt protection (+/- 10%). In trials with Novec, about 33% of the alternative gas was required to provide the same protection. (see attached spreadsheet) The spreadsheet shows that for every ton of metal, about 2.22 pounds of SF₆ was used per ton of metal compared to 0.77 pounds for Novec and 0.65 pounds for SO₂ respectively. In other words, for every 1 kg of SF₆ used in the baseline, about 1/3 kg of SO₂ would be required and about 75% of Novec would do the job. The cost of SO₂ is about 40% of the cost of SF₆. As for Novec, the contract with the supplier, 3M, has not been finalized, but Meridian was quoted a figure of \$15/pound, which is about twice as expensive as SF₆.

Capital Costs: Switching to either Novec or SO₂ does require capital costs. In both cases, new piping has to be installed in the plant, along with new cabinets holding the gases and the computer controls, flow meters and other equipment needed to ensure the flow rates and concentrations remain constantly within optimal operating parameters. In the case of SO₂, the cost is a little bit higher because the pipes required are stainless steel; Novec, like SF₆, can use copper piping. Both gases also require extensive trials to determine the exact flow rate and concentration that would be required to ensure the magnesium quality is fully protected. One other factor to consider is that SO₂ requires additional training, monitoring equipment and protective suits to ensure the health and safety of workers. With about 70 workers, Meridian estimates these costs to be \$140,000 per year – and these costs would be incurred each year SO₂ is used.

Capital Costs of Switching – for Michigan facility only (Ontario plant is about the same)

	Die Cast – Novec	Recycling – SO ₂
Gas mixing cabinet	142,100	290,000
Piping Installation	39,855	22,189
Electrical Installation	20,000	25,000
Stock room spares	40,000	40,000
Monitoring	5,000	5,000
PPE		15,000
Enviro Testing		10,000
Misc	15,000	20,000
Totals	261,955	427,189

TOTAL COST: \$689,000 per facility

It should also be stated that SF6 is the safest from an operator point-of-view, in the sense that SF6 and its protective qualities are known. Using a different cover gas presents many unknowns in terms of metal quality (which has to be absolutely precise for customers). This is why so many trials are required, and many facility managers do not want to be bothered.

VERs: The Michigan facility is estimated to generate about 240,000 VERs per year. The contract with CCC calls for a price of \$3.50 per ton of CO₂eq. reduced. That would provide an estimated \$840,000 per year of income. This would more than cover both the one-time capital cost of \$685,000, plus the \$140,000 per year in higher operating costs for the use of SO₂, plus the higher cost of Novec gas. In fact, through 2012, the total cost of switching from SF6 will be: 685,000 + 10(140,000) + 10(4.125 tons of Novec * 2000 * \$7) + 10(5.5 tons of SO₂ * 2,000 * \$3.25/pound). (seven is the difference in the cost of the Novec from SF6 per pound). That is the cost to Meridian with no other revenue except for the carbon credits. With the carbon credits, Meridian could earn 840,000 * 10 years or = \$8,400,000. So Meridian can make about \$5 million doing this effort as a VER project. Or it could lose almost \$2.5 million without the carbon credits. The investment analysis clearly shows that Meridian would have no incentive to switch away from SF6 without the potential of generating verified emission reduction credits, and selling them to CCC.

For Michigan Plant Only

Cover Gas	Cost per pound	On-going maintenance costs per year	Total Annual Operating Costs Assuming 5.5 tons of SF6 and equivalent amount of alternative is required	Capital Costs to Switch	Total Cost Assuming a 10 year crediting period and assuming Mg production does not change and prices of gas do not change
SF6	\$8.11	0	\$89,210	0	\$892,100
Novec	\$15	0	\$123,750*	262,000	\$1,499,500
SO2	\$3.25	\$140,000	\$11,789**	427,000	\$1,944,890
				Total net cost through 2016 of switching	3,444,390
				Carbon Revenue assume total of 240,000 VERs/year (for Michigan plant only) or 2,400,000 VERs total at \$3.50 per ton of CO₂eq	8,400,000
				Net loss without Carbon revenues (total costs – costs of using SF6)	(2,552,290)
				Net Gain with Carbon Revenues	4,955,610

*4.125 tons of Novec should be required, which is 75% of 5.5 tons of SF₆ eq.: 4.125 * \$15 * 2000

**1.815 tons of SO₂, which is 33% of 5.5 tons of SF₆ eq * 3.25/lb = \$11,789

Total annual gas costs: \$135,539

Total annual maintenance: \$140,000

In the attached spreadsheets, it can be demonstrated that the project is very cash-negative without carbon, with an NPV of -\$3.4 million. When carbon revenues are taken into account, the NPV at 10% is \$3.8 million. For these reasons, there is no purpose in doing a sensitivity analysis. Adjusting the numbers in any reasonable fashion for such an analysis would not change the outcome of the result that without carbon, the project is unprofitable and with carbon, the project is profitable.

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):

The project proponent shall in the VCS PD, in addition to describing how the project meets the VCS methodology, demonstrate that the project is additional based on one of the tests, the project test, the performance test, and technology test.

This project will use the **“Combined tool to identify the baseline scenario and demonstrate additionality.”** The steps are as follows:

STEP 1. Identification of alternative scenarios

Step 1a. Define alternative scenarios to the proposed CDM project activity (described above)

This has been described above

Sub-step 1b. Consistency with mandatory applicable laws and regulations:

All alternatives are currently in compliance with local and national laws.

STEP 2. Barrier analysis

Step 2 of the tool requires the project participant establish a complete list of realistic and credible barriers that may prevent alternative scenarios to occur. As described above, the only plausible baseline scenarios are the use of Novec without carbon finance, the use of SO₂ or the continued situation of using SF₆.

Alternative	Barrier
Current Situation (SF ₆)	No barrier exists
SO ₂ without carbon finance	Higher capital costs and operational costs; since no financial incentive or regulation exists to cause the switch over this option would not be implemented and can be disregarded from further consideration for Step 2.
Novec (without carbon finance)	Costs of gas are 3-4 times higher than SF ₆ , and capital costs for making the switchover are also required. Since no financial incentive or regulation exists to cause the switch over this option would not be implemented and can be disregarded from further consideration for Step 2.

	Novec is also a totally new gas, never used commercially in the US before. As such, there is hesitation on the part of facility managers to use such a new alternative when the effectiveness of SF6 has been known and understood for so long. The use of Novec by Meridian required extensive trials under every operating condition, and this upfront cost – coupled with the higher cost of the gas itself – was a major disincentive for using Novec without selling the VERs from the project to Climate Change Capital.
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According to Step 2 of the tool, if there is only one alternative scenario that is not prevented by any barrier, and if this alternative is not the proposed project activity undertaken without being registered as a project activity, then this alternative scenario is identified as the baseline scenario (in this case, continued use of SF6). Explain – using qualitative or quantitative arguments – how carbon finance will alleviate the barriers that prevent the proposed project activity from occurring in the absence of the carbon finance. If the carbon finance alleviates the identified barriers that prevent the proposed project activity from occurring, proceed to Step 4.

See Step 3 of the Baseline Scenario Analysis

STEP 3. Investment analysis (if applicable)

See Step 3 of the Baseline Scenario Analysis

STEP 4. Common practice analysis

Novec has not been used anywhere else in the US on a commercial basis. SO2 has been used but on a limited basis. The US EPA maintains a magnesium partnership program with most of the members of the industry based in the US participating. According to US EPA, Meridian will be the first to completely switch away from SF6. Interviews with US EPA can confirm this fact.

3 Monitoring:

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

This project uses a CDM-approved methodology, AM0065: “Replacement of SF₆ with alternate cover gas in the magnesium industry”

3.2 Monitoring, including estimation, modelling, measurement or calculation approaches:

- Purpose of monitoring
- Types of data and information to be reported, including units of measurement
- Origin of the data)
- Monitoring, including estimation, modelling, measurement or calculation approaches
- Monitoring times and periods, considering the needs of intended users

- *Monitoring roles and responsibilities*
- *Managing data quality*

The methodology used is AM0065.

The monitoring process requires the production of magnesium to be calculated using weighing methods and multiplying those numbers by the TSF6/TMg ratio calculated in the baseline. In other words, we are determining how much SF6 would have been used with the metal production numbers in the crediting year. Those are the baseline emissions. Project emissions are calculated by determining the amount of SF6 that was used in the project year and the amount of alternative gas used. Using flow meter readings and the weighing of bottles, we can determine the amounts of gas used. In the case of Novec, we multiply the amount of Novec used by a default GWP of 2,830 TCO2eq/Ton of Novec used. This is deducted from the baseline emissions to obtain a figure for emission reductions.

Data sources that are therefore monitored are: Metal production, SF6 used, CO2 used, Novec used. In addition, we monitor the amount of SO2 because while SO2 is not a GHG, we need to determine that the use and handling of SO2 is in compliance both with local regulations and with AM0065. Data sources other than those monitored are primarily the baseline, which primarily includes the use of SF6 and metal production for each segment of the facility for up to three years. This data is provided at the end of this document.

In terms of overall management of the project, Chuck Woodburn has overall responsibility for all aspects of monitoring this project, including:

- Compiling all magnesium production numbers, so we can accurately know production, the key factor for determining baseline emissions in each project year. This task includes calibrating the scales to ensure they are accurate.
- Gas consumption: For every gas consumed, Novec, SO2, CO2 and when necessary, SF6, Mr. Woodburn will compile all gas consumption numbers, including compilation of readings off the flow controllers, so the data can be archived. This task also involves ensuring all flow meters are periodically checked to ensure smooth operation. Meridian will also work to ensure that any situations that might require the resumption of SF6 use are minimized as much as possible.
- SO2 management: Meridian has an extensive training system so personnel who might be exposed to SO2 fumes are properly prepared. This monitoring task includes the need to ensure that all SO2 sensors are operating effectively, so if emissions do exceed certain limits, an alarm will sound and that section of the plant can be evacuated. Finally, this monitoring task involves ensuring SO2 use and management are fully in compliance with AM0065's specifications dealing with SO2.

Baseline emissions are calculated according to Case 2 in AM0065, where the consumption of gas for the total facility is available:

$$BE_y = \sum_j \sum_k P_{Mg,PJ,j,k,y} * GWP_{SF6} * EF_{SF6,Mg} \quad (5)$$

Where:

- BE_y = Baseline emissions in year y (tCO₂e/yr)
 $EF_{SF6,Mg}$ = Baseline emission factor for the facility (tSF₆/ tMg)
 $P_{Mg,PJ,k,j,y}$ = Annual amount of Mg products manufactured in project scenario in each equipment k in each segment j per year y .
 GWP_{SF6} = Global Warming Potential of SF₆ (tCO₂e/ tSF₆)

$$EF_{SF6,Mg} = \frac{C_{SF6,EM,BL}}{P_{Mg,BL,TOTAL}} \quad (6)$$

Where:

- $P_{Mg,BL,TOTAL}$ = Total Amount of Mg products manufactured in baseline scenario in the facility (tMg/ yr).
 $C_{SF6,EM,BL}$ = Total SF₆ actually emitted in the baseline in the facility. (tSF₆/ yr)

$$C_{SF6,EM,BL} = C_{SF6,CON,BL} * DF_{SF6} * DI_{SF6,CON,BL} \quad (7)$$

Project emissions is equal to the use of the alternative gas (Novec in this case), which has a GWP based on default values of its by-products, along with SF₆ and CO₂. In the case of this project, no SF₆ or CO₂ will be used in the project scenario. The SF₆ will be completely eliminated, and the carrier gas for the alternative gases will be dry air. The only exception to this is that some SF₆ was used in 2007 when the trials began in the Canada plant on the different gases. This level of SF₆ use is reflected in the calculations.

Project emissions are calculated as follows:

$$PE_y = PE_{ALTGAS,y} + PE_{SF6,y} + \sum_{j,y} C_{CO2,PJ,j,y} \quad (9)$$

Where:

- PE_y = Project emissions in year y (tCO₂e/yr)
 $PE_{ALTGAS,y}$ = Project emissions from the use of HFC134a or Perfluoro-2-methyl-3-pentanone, if it is used as cover gas in project scenario - summing of all segments j - in year y (tCO₂e/yr)
 $PE_{SF6,y}$ = Project emissions from the use of SF₆ - summing of all segments j - in year y

3.3 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

Describe each data and parameter using this table.

Data / Parameter:	
Data unit:	
Description:	
Source of data to be used:	
Value of data applied for the purpose of calculating expected emission reductions	

Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	

Data Not Monitored and Provided Upon Validation

Data / Parameter:	GWP of SF₆
Data unit:	tCO ₂ eq/tSF ₆
Description:	Global Warming Potential of SF ₆
Source of data used:	IPCC
Value applied:	22,200
Justification of the choice of data or description of measurement methods and procedures actually applied :	RGGI uses the 2006 IPCC number, so this is what is used for this project.
Any comment:	

Data / Parameter:	PM_{g,BL,TOTAL}
Data unit:	tMg per year
Description:	Amount of Mg products manufactured in baseline scenario in the facility (tMg/yr).
Source of data used:	Meridian Magnesium Products
Value applied:	28,348 total for die casting for US 20,342 total for recycling for US 26,950 total for die casting for Canada 6,262 total for recycling for Canada
Justification of the choice of data or description of measurement methods and procedures actually applied :	Measured by calibrated scales according to on-site working procedures. Scales are calibrated frequently since this parameter is essential to the core business of the plant. Calibration frequency shall follow on-site calibration procedures. Calibration data will be provided upon site visit. It is important to note that the magnesium for recycling is weighed, but the metal melted for die casting is not entirely weighted, but rather sample parts are weighed. However, it can be demonstrated that this method is still extremely accurate. Die cast parts are produced in the same exact die cast mold. Meridian weighs a part that comes from that die mold. Because the die mold is exactly the same, each part will weigh exactly the same. The only case where this might NOT be the case is if a different alloy is used. In this case, Meridian always weighs a sample part that comes from a different alloy. So any differences in the weight from each die cast part can be accounted for. In addition, sample cross-checks are done by Meridian's customers, the auto companies. This is because the auto companies pay for the Mg part by weight, so they want to make sure they get what they are paying for. If the parts do not weigh

VCS Project Description Template

	what they're supposed to, the auto company will no doubt complain. So this can be another cross-check for the weight of total metal production. Beginning after the commencement of this project, metal bundles before melting will be weighed and cross-checked with the original method described above.
Any comment:	

Data / Parameter:	C _{SF6,TOT,BL}
Data unit:	tSF ₆
Description:	Minimum of annual TOTAL consumption of SF ₆ in the facility for the last three years prior to validation.
Source of data used:	Meridian Magnesium Products
Value applied:	5.7057 for die casting 12.4625 for recycling
Justification of the choice of data or description of measurement methods and procedures actually applied :	Measuring flow rates and integrating over time (flow measurement method). The way Meridian measures SF ₆ use is through flow meters. But the weights of the SF ₆ bottles, both before and after use, can also show amount used. This data can be provided as a crosscheck
Any comment:	<i>Weighing SF₆ Cylinders:</i> The key methods to determine how much SF ₆ is actually consumed is based on (1) the accounting method (recording and putting into an inventory database the recorded amount of SF ₆ in the cylinder, as provided by the SF ₆ manufacturer); and (2) the weight method. Under #2, the weight of the SF ₆ cylinder should be weighed when the bottle is fill and when the bottle is sent back to the manufacturer. The difference would be the amount of SF ₆ used.

Data / Parameter:	DF _{SF6}
Data unit:	fraction
Description:	Default percentage of SF ₆ assumed to be destroyed in the magnesium process and thus not emitted, thereby reducing baseline emissions.
Source of data used:	According to AM0065
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to AM0065
Any comment:	

Data / Parameter:	GWP _{ALTGAS}
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VCS Project Description Template

Data unit:	tCO ₂ e/ t alternative gas
Description:	GWP of Novec
Source of data to be used:	CDM EB
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Global Warming Potential of alternate gas. In case of using Perfluoro-2-methyl-3- pentanone the value used is 1.
Description of measurement methods and procedures to be applied:	Prior to the renewal of a crediting period it should be assessed if GWP values have changed.
QA/QC procedures to be applied:	NA
Any comment:	

Data/Parameter:	$DI_{SF_6,CON,BL,k,j} / DI_{SF_6,CON,BL}$
Data unit:	Fraction
Description:	A conservative factor portraying the Data Integrity of $C_{SF_6,CON,BL,k,j,y} / C_{SF_6,CON,BL}$ in each equipment k in each segment. Default= 0.95.
Source of data:	IPCC guidelines
Measurement procedures (if any):	Prior to the renewal of a crediting period it should be assessed if the Conservative Factor default should be changed.
Any comment:	This value shall account for the uncertainty in SF ₆ consumption. IPCC guidelines state that direct reporting has a 5% uncertainty level ⁶ . 0.95 shall be used as the default factor unless the project proponent can demonstrate to the DOE that their estimates of $C_{SF_6,CON,BL,k,j} / C_{SF_6,CON,BL}$ are more than 95% accurate. Project proponents that submit monitoring data for $C_{SF_6,CON,BL,k,j} / C_{SF_6,CON,BL}$ using two or more of measurement procedures listed in the monitoring section (e.g., both the weight difference and accounting method), and can consistently demonstrate a difference of less than 5% between these two estimates over the time series are allowed to multiply their SF ₆ consumptions by a factor greater than 0.95. In no case should a factor of 100% be used.

Data/Parameter:	CF
Data unit:	--
Description:	Conservative Factor. To compensate for the uncertainty in the global warming potential of the by products emitted after the degradation of the alternate gas (default value of 1.26 for HFC134a and 2,830 for Perfluoro-2-methyl-3-pentanone)
Source of data:	Based on the test results provided in EPA, "Characterization of Cover Gas Emissions from U.S. Magnesium Die Casting", Office of Air and Radiation, May 2004.
Measurement procedures (if any):	Prior to the renewal of a crediting period it should be assessed if the Conservative Factor should be changed, due to the publication of new experiment results or GWP values.
Any comment:	

Data That Is Monitored During Each Project Year

Data / Parameter:	$P_{Mg,PJ,k,j,y}$
Data unit:	tMg/yr
Description:	Production output: annual amount of Mg or Mg products manufactured in project scenario in each equipment k in each segment j per year.
Source of data to be used:	Meridian Magnesium Products
Value of data applied for the purpose of calculating expected emission reductions in section B.5	27,600 total for die casting for US 20,334 total for recycling for US 25,025 total for die casting for Canada 5,915 total for recycling for Canada
Description of measurement methods and procedures to be applied:	Measured by calibrated scales according to on-site working procedures
QA/QC procedures to be applied:	Scales will be calibrated annually with standard weight. Figures to be crosschecked with internal sales and stock reports. Scales are usually calibrated more than once a year since this parameter is essential to the core business of the plant. Calibration frequency shall follow onsite calibration procedures, but shall be conducted at least annually. It is important to note that the magnesium for recycling is weighed, but the metal melted for die casting is not entirely weighed, but rather sample parts are weighed. However, it can be demonstrated that this method is still extremely accurate. Die cast parts are produced in the same exact die cast mold. Meridian weighs a part that comes from that die mold. Because the die mold is exactly the same, each part will weigh exactly the same. The only case where this might NOT be the case is if a different alloy is used. In this case, Meridian always weighs a sample part that comes from a different alloy. So any differences in the weight from each die cast part can be accounted for. In addition, sample cross-checks are done by Meridian's customers, the auto companies. This is because the auto companies pay for the Mg part by weight, so they want to make sure they get what they are paying for. If the parts do not weigh what they're supposed to, the auto company will no doubt complain. So this can be another cross-check for the weight of total metal production. Beginning after the commencement of this project, metal bundles before melting will be weighed and cross-checked with the original method described above.
Any comment:	

Data / Parameter:	$C_{ALTGAS,PJ,k,j,y}$
Data unit:	T / year
Description:	Consumption of alternate gas in project scenario for each equipment k in each

VCS Project Description Template

	segment j per year.
Source of data to be used:	Meridian Magnesium Products
Value of data applied for the purpose of calculating expected emission reductions in section B.5	11.75 tons of Novec to be used per year (estimated)
Description of measurement methods and procedures to be applied:	The same procedures recommended by IPCC for direct reporting of SF ₆ consumption shall be practiced for the measurement of alternate gas which will be measured by using flow meters and measuring flow rates and integrating over time (flow measurement method)
QA/QC procedures to be applied:	To ensure consistency between baseline and project calculations, the measurement method of alternate gas shall follow the same method conducted for SF₆. When relying on measurements of cylinder weight or flow rates, measurements shall be cross-checked with purchase receipts. In case of uncertainty, the highest value of alternate gas shall be used resulting in the highest value for $C_{ALTGAS,PJ,k,j,y}$ and therefore the highest value of project emissions (conservative assumption). When using the weight difference method, scales should be calibrated annually using a standard weight. When using the flow measurement method, flow meters should be calibrated annually using an on-site standard gas sample of alternate gas or by an external certified company. The measurement of flow rate should be measured in normal cubic meter and converted to weight units. Normalization should be based on temperature and pressure readings and on the density of alternate gas.
Any comment:	

Data / Parameter:	CSF ₆ ,CON,PJ,k,j,y
Data unit:	tSF ₆ /yr
Description:	The total consumption of SF ₆ in the industrial facility in the project scenario in each equipment in each segment, per year
Source of data to be used:	Meridian
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Measuring flow rates and integrating over time (flow measurement method). The way Meridian measures SF₆ use is through flow meters. But the weights of the SF₆ bottles, both before and after use, can also show amount used. This data can be provided as a crosscheck <i>Weighing SF₆ Cylinders:</i> The key methods to determine how much SF₆ is actually consumed is based on (1) the accounting method (recording and putting into an inventory database the recorded amount of SF₆ in the cylinder, as provided by the SF₆ manufacturer); and (2) the weight

	method. Under #2, the weight of the SF ₆ cylinder should be weighed when the bottle is fill and when the bottle is sent back to the manufacturer. The difference would be the amount of SF ₆ used.
QA/QC procedures to be applied:	Same as for alternative cover gases.
Any comment:	

3.4 Description of the monitoring plan

Attached in a separate document is the organizational chart for the management of this project. Chuck Woodburn has overall responsibility for all aspects of monitoring this project, including:

- Compiling all magnesium production numbers, so we can accurately know production, the key factor for determining baseline emissions in each project year. This task includes calibrating the scales to ensure they are accurate.
- Gas consumption: For every gas consumed, Novec, SO₂, CO₂ and when necessary, SF₆, Mr. Woodburn will compile all gas consumption numbers, including compilation of readings off the flow controllers, so the data can be archived. This task also involves ensuring all flow meters are periodically checked to ensure smooth operation. Meridian will also work to ensure that any situations that might require the resumption of SF₆ use are minimized as much as possible.
- SO₂ management: Meridian has an extensive training system so personnel who might be exposed to SO₂ fumes are properly prepared. This monitoring task includes the need to ensure that all SO₂ sensors are operating effectively, so if emissions do exceed certain limits, an alarm will sound and that section of the plant can be evacuated. Finally, this monitoring task involves ensuring SO₂ use and management are fully in compliance with AM0065's specifications dealing with SO₂

4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

The primary methodological choice in AM0065 is whether to measure the baseline across the entire facility or machine by machine. This project will determine the baseline across the entire facility. In addition, another methodological choice is the cover gas which will be used. In this case, Novec and SO₂ will be used, not HFC-134a, which is also allowed by AM0065.

4.2 Quantifying GHG emissions and/or removals for the baseline scenario:

The baseline scenario uses the ratio of SF₆ consumed to unit of magnesium produced over three baseline years to determine the emissions factor (discounted for

uncertainties such as how much SF₆ is destroyed in the baseline, as set out in AM0065). That emissions factor is multiplied by the amount of magnesium produced in each segment (die casting or recycling) in each year to determine how much SF₆ would have been used and emitted had the project to stop using SF₆ not gone forward.

The formula can be expressed as follows:

$$BE_y = \sum_j \sum_k P_{Mg,PJ,j,k,y} * GWP_{SF6} * EF_{SF6,Mg} \quad (5)$$

Where:

BE_y = Baseline emissions in year y (tCO₂e/yr)

$EF_{SF6,Mg}$ = Baseline emission factor for the facility (tSF₆/ tMg)

$P_{Mg,PJ,k,j,y}$ = Annual amount of Mg products manufactured in project scenario in each equipment k in each segment j per year y .

GWP_{SF6} = Global Warming Potential of SF₆ (tCO₂e/ tSF₆)

$$EF_{SF6,Mg} = \frac{C_{SF6,EM,BL}}{P_{Mg,BL,TOTAL}} \quad (6)$$

Where:

$P_{Mg,BL,TOTAL}$ = Total Amount of Mg products manufactured in baseline scenario in the facility (tMg/ yr).

$C_{SF6,EM,BL}$ = Total SF₆ actually emitted in the baseline in the facility. (tSF₆/ yr)

$$C_{SF6,EM,BL} = C_{SF6,CON,BL} * DF_{SF6} * DI_{SF6,CON,BL} \quad (7)$$

The baseline data is provided below.

Michigan

Die Casting		2005	2006	2007
	US Die casting SF6 (lbs)	14,740	10,788	10,981
	US Die casting Metal (lbs)	62,672,227	56,085,588	56,696,032
P _{Mg,BL}	Total Mg Production (short tons)	31,336	28,043	28,348
SF6con	Total SF6 Use (short tons)	7.37	5.39	5.49
DF _{SF6}	50% discount	3.69	2.70	2.75
DISF6,CON	5% discount	3.50	2.56	2.61
EF, SF6	EF	0.000112	0.0000914	0.0000920
	TCO2eq assuming lowest year of P			
		2005	2006	2007
Recycling	US SF6 use in recycling facility (lbs)	34,234	34,923	44,222
	US recycling metal	42,236,980	40,996,103	40,683,251
P _{Mg,BL}	Total Mg Production (tons)	21,118	20,498	20,342
SF6con	Total SF6 Use (tons)	17.12	17.46	22.11
DF _{SF6}	50% discount	8.558500	8.730750	11.055500
DISF6,CON	5% discount	8.130575	8.294213	10.502725
EF, SF6	EF	0.000385	0.000405	0.000516
	TCO2eq			

GWP of SF6 = 22,800

Project Emissions -- Novec
GWP=2830

Ontario

Die Casting		2004*	2005	2006
	Canada Die casting SF6 (lbs)	9,315	7,386	7,070
	Canada Die casting Metal (lbs)	71,865,712	63,956,200	59,290,000
P _{Mg,BL}	Total Mg Production (metric tons)	32,666	29,071	26,950
SF6con	Total SF6 Use (short tons)	4.66	3.69	3.54
DF _{SF6}	50% discount	2.33	1.85	1.77
DISF6,CON	5% discount	2.21	1.75	1.68
EF, SF6	EF (determined using short tons)	0.000062	0.0000549	0.0000566
	TCO2eq assuming lowest year of P	45,855	36,359	34,804
		2004	2005	2006
Recycling	Canada SF6 use in recycling facility (lbs)	21,024	25,534	NA
	Canada recycling metal (lbs)	14,596,869	14,205,400	13,776,400
P _{Mg,BL}	Total Mg Production (metric tons)	6,635	6,457	6,262
SF6con	Total SF6 Use (short tons)	10.51	12.77	
DF _{SF6}	50% discount	5.256000	6.383500	
DISF6,CON	5% discount	4.993200	6.064325	
EF, SF6	EF (determined in short tons)	0.000684	0.000854	
	TCO2eq		100,720	

This data leads to the following EFs

Lowest baseline emissions factor for US Die Casting	TSF6/TMg	0.0000914
Lowest baseline emissions factor for US Recycling	TSF6/TMg	0.000385
Lowest baseline emissions factor for Canada Die Casting	TSF6/TMg	0.0000549
Lowest baseline emissions factor for Canada Recycling	TSF6/TMg	0.000684

4.3 Quantifying GHG emissions and/or removals for the project:

GHG emissions from the project itself includes both emissions of SF₆ which might occur during the project period and the use of Novec. According to AM0065, Novec gives off GHG by-products that are hard to measure. Thus the methodology uses a default for Novec of 2,830. So for every ton of Novec used, 2,830 tons of CO₂eq must be considered as project emissions. In the case of Meridian, it is estimated that its die casting facility in Michigan will use about 3 tons per year, or about 8,490 TCO₂eq.

Thus, the following formula can be used:

Project emissions are calculated as follows:

$$PE_y = PE_{ALTGAS,y} + PE_{SF6,y} + \sum_{j,y} C_{CO2,PJ,j,y} \quad (9)$$

Where:

PE_y = Project emissions in year y (tCO₂e/yr)

$PE_{ALTGAS,y}$ = Project emissions from the use of HFC134a or Perfluoro-2-methyl-3-pentanone, if it is used as cover gas in project scenario - summing of all segments j - in year y (tCO₂e/yr)

$PE_{SF6,y}$ = Project emissions from the use of SF₆ - summing of all segments j - in year y

4.4 Quantifying GHG emission reductions and removal enhancements for the GHG project:

See Accompanying Spreadsheet for calculations. In this case, emission reductions is simply equal to baseline emissions – project emissions. $ER = BE - PE$. There are no expected sourced of leakage from this project.

See ISO 14064-2: 5.2.k for quantifying GHG emission reductions or removal enhancements.

5 Environmental Impact:

Environmental impacts of this project are expected to be small. Novec has no known environmental impacts. The use of SO₂ is too small to require any kind of permitting or license. A paper on the minimal impacts of Novec has been passed on to DNV.

6 Stakeholders comments:

NA

7 Schedule:

Project Start Dates

US Die Casting: April 1, 2008

US Recycling: April 1, 2008

Canada Die Casting: May 1, 2008

Canada Recycling: January 1, 2007

Monitoring: Metal weighted is entered into database each month; verification takes place early each year for the preceding year. Transfer of VERs from Meridian to CCC takes place on March 31 of each year.

8 Ownership:

8.1 Proof of Title: The ERPA between CCC and Meridian, showing that CCC has title over the VERs has been provided to DNV.

Provide evidence of proof of title through one of the following:

- *a legislative right;*
- *a right under local common law;*
- *Ownership of the plant, equipment and/or process generating the reductions/removals;*
- *A contractual arrangement with the owner of the plant, equipment or process that grants all reductions/removals to the proponent*

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

Project proponents of projects that reduce GHG emissions from activities that:

- are included in an emissions trading Program; or
- take place in a jurisdiction or sector in which binding limits are established on GHG emissions;

shall provide evidence that the reductions or removals generated by the project have or will not be used in the Program or jurisdiction for the purpose of demonstrating compliance. The evidence could include:

- a letter from the Program operator or designated national authority that emissions allowances (or other GHG credits used in the Program) equivalent to the reductions/removals generated by the project have been cancelled from the Program; or national cap as applicable or;
- purchase and cancellation of GHG allowances equivalent to the reductions/removals generated by the project related to the Program or national cap.

Letter from Canadian government is pending. Not required for US facility.

