



# Waste Minimisation Fund

## Application Form for Project Funding

May 2019

### Please Complete

Applicant name	EFF-GO Ltd
Project name	EFF-GO Prototype - a 21 <sup>st</sup> century solution for 21 <sup>st</sup> century waste
Total cost of project	\$384,680.00
Amount requested from WMF	\$368,680.00

## Introduction

This application form is for project proposals to the 2019 May funding round of the Ministry for the Environment's Waste Minimisation Fund (WMF). We strongly recommend that you read the *Waste Minimisation Fund Guide for Applicants* before completing this form. Please read the [Waste Minimisation Fund Guide for Applicants](#) (the guide) before completing this application form.

Please complete this form electronically and submit it by email. Move between fields by using the mouse, or pressing the ↑ and ↓ keys on your keyboard. Use text only; do not enter images, tables or graphs into the form.

If you need help to complete the WMF application form, refer to the guide in the first instance. For any further information, email [wmf@mfe.govt.nz](mailto:wmf@mfe.govt.nz), or call 0800 499 700.

All applications must be completed using this application form.

## When your application is complete

Completed application forms (including all supporting information) must be received by the Ministry for the Environment by **midday, Tuesday 28 May 2019**. We are unable to accept late applications. We are also unable to assess incomplete applications, so it is important you provide all the required information.

Email your completed application form and supporting documentation (as required) to [wmfapplication@mfe.govt.nz](mailto:wmfapplication@mfe.govt.nz) (with 'WMF application' and your organisation name in the subject line). Please note that we will only accept **one email per application** – documents submitted as multiple emails will not be accepted.

### **Official Information Act 1982**

**Important:** Information presented to the Minister for the Environment or the Ministry for the Environment is subject to disclosure under the Official Information Act 1982 (OIA). Certain information may be withheld in accordance with the grounds for withholding information under the OIA. Further information on the OIA is available at [www.ombudsmen.parliament.nz](http://www.ombudsmen.parliament.nz).

Information held by the Minister or Ministry may have to be released under the OIA in response to a request from a member of the public (or any other body) for that information. If you wish to provide sensitive information to the Minister or Ministry which you do not want released, it is recommended you consult with the Ministry as to whether the information is necessary for the application, and whether there may be grounds in the OIA for withholding the information. For instance, if release of the information would disclose a trade secret, or be likely to unreasonably prejudice the commercial position of the person who supplied or who is the subject of the information, then there may be grounds to withhold the information. If an OIA request relating to your application is received, the Ministry will endeavour to contact you to discuss it, and what the implications of releasing your information are.

The grounds for withholding information must always be balanced against consideration of public interest that may justify release. Although the Ministry does not give any guarantees as to whether information can be withheld under the OIA, it may be helpful to discuss OIA issues with the Ministry in advance if information provided with an application is sensitive.

### **Privacy Act 1993**

**Important:** The Ministry for the Environment (Environment House, 23 Kate Sheppard Place, Thorndon, Wellington) may collect, use, hold or disclose personal information for the purpose of assessing eligibility and suitability for Waste Minimisation Fund funding. Individuals have the right in accordance with the Privacy Act 1993 to request access to and correction of their personal information. While the provision of personal information is not mandatory, failure to provide requested information could lead to a delay in considering the application or a decline of the same.

## Eligibility criteria

Applications to the Waste Minimisation Fund must meet the eligibility criteria below. The following self-assessment checklist is based on the fund criteria, as notified under the *New Zealand Gazette*. Applicants must be able to answer 'yes' for each of the criteria below. If you cannot meet these criteria you are not eligible to apply to the Waste Minimisation Fund.

### Self-assessment checklist

Does your project meet the following criteria?		Yes / No
1	Only waste minimisation projects are eligible for funding. Projects must promote or achieve waste minimisation. Waste minimisation covers the reduction of waste and the reuse, recycling and recovery of waste and diverted material.	Yes
2	Projects must promote or achieve new waste minimisation activity, either by implementing new initiatives or a significant expansion in the scope or coverage of existing activities.	Yes
3	Funding is not for the ongoing financial support of existing activities, nor is it for the running costs of the existing activities of organisations, individuals, councils or firms	Yes
4	Projects should be for a discrete timeframe of up to three years, after which the project objectives will have been achieved and, where appropriate, the initiative will become self-funding.	Yes
5	Funding can be for operational or capital expenditure required to undertake a project.	Yes
6	For projects where alternative, more suitable, Government funding streams are available (such as the Contaminated Sites Remediation Fund or research funding from the Ministry of Business, Innovation and Employment), applicants should apply to these funding sources before applying to the Waste Minimisation Fund.	Yes
7	The applicant must be a legal entity.	Yes
8	The fund will not cover the entire cost of the project. Applicants will need part funding from other sources.	Yes
9	The minimum grant for feasibility or scoping studies will be \$10,000. The minimum grant for other projects will be \$50,000.	Yes
<b>Scope</b>		
10	<p>The scope of the fund includes, but is not limited to:</p> <ul style="list-style-type: none"> <li>educational projects that promote waste minimisation activity</li> <li>projects that address litter</li> <li>projects focused on gaining an understanding of existing waste quantities and composition, behaviour, or economic incentives, as a precursor to effectively reducing waste and/or increasing reuse, recycling, and recovery of waste materials</li> <li>the design of targeted product stewardship schemes to promote and achieve waste minimisation in line with the Ministry's strategic priorities.</li> </ul>	Yes

## SECTION A: Applicant details

See pages 13 and 14 of the Guide for Applicants for information on how to complete this section.

### 1. A. Organisation details

Organisation's legal name <i>one name only</i>	EFF-GO Ltd			
Trading name (if different)	EFF-GO			
Description of your organisation	EFF-GO Ltd is an innovative waste treatment company based in the Manawatu, it is currently focused upon the commercialisation of SuperCritical Water Oxidation.			
Company / Incorporated Society / Registered Charitable Trust No.	9429046060365			
Physical address <i>include post code</i>	98 Oxford St, Ashhurst, Palmerston North 4810			
Postal address <i>include post code</i>	98 Oxford St, Ashhurst, Palmerston North 4810			
Telephone	+64 21 304 009			
Website address	not currently available - domain name has been reserved, to be developed during project			
GST number <i>Enter 'N/A' if you are not GST registered.</i>	122-619-028			
Legal entity status <i>select one only</i>  <i>(You will be required to provide a certificate of incorporation if you are invited to Stage II of the funding process)</i>	<input type="checkbox"/> Incorporated society	<input type="checkbox"/> Charitable trust	<input type="checkbox"/> Limited partnership	<input type="checkbox"/> Māori trust board
	<input checked="" type="checkbox"/> Limited liability or cooperative company	<input type="checkbox"/> Territorial authority	<input type="checkbox"/> Other <i>please specify</i>	

### 1. B. if you are a Territorial or Unitary Authority

Please explain why this project:

- is not funded out of your council's baseline funding
- does not fall under your council's core responsibilities
- is not funded out of levy money received under section 31 of the Waste Minimisation Act 2008.

Not applicable

## 1. C. All other applicants

### Please explain why this project requires WMF funding to be successful

There are two main reasons why WMF funding is required for the EFF-GO prototype:

1. The EFF-GO process is of national significance, in that it offers New Zealand a sustainable solution for its municipal sewage sludges and recalcitrant organic waste streams. The EFF-GO process will initially target New Zealand's sewage sludge volumes, which are approx. 112,000t/yr, based upon WaterNZ data, but figures as high as 500,000t/yr have been quoted in the press. Currently the two significant disposal options are landfill and composting. Neither of these two processes can effectively treat sewage sludge; landfill degrades sludges over decades and composting of sludges is more closely aligned with dilution than treatment. Both processes, landfill and composting, have significant capacity issues. Landfill void space is reducing and options for new fully compliant landfills are not plentiful, if at all present. Composting sewage sludge is heavily market driven and relies upon the sale of the finished product to offset treatment costs. Remove the end user and you have a growing pile of compost and costs. In addition, uncertainty over the long-term environmental impact of sewage sludge compost is growing in the scientific literature, due to the synthetic chemical and heavy metal components within municipal sewage sludges. The EFF-GO process offers a sustainable solution that aligns with NZ governmental aims - waste minimisation, landfill diversion, ground water protection; through the elimination of landfill leachate creation as a by-product of sewage sludge decay; and the creation of a sustainable treatment option for municipal sewage sludges without the risk of future liabilities associated with the composting of sewage sludges. Once established as a sewage sludge treatment process the same concept can be applied to other organic waste streams that are similarly incompatible with current biological treatment processes, due to increasing concentrations of synthetic compounds prohibiting complete microbial decay, or can be more effectively managed, in terms of cost and treatment efficiency, by the EFF-GO process.

2. The EFF-GO process is too novel for the private investment market without a functional prototype. Despite being based upon the internationally proven treatment process that is SuperCritical Water Oxidation (SCWO). A process grounded upon physical and chemical facts, it does convert all organic matter, irrespective of toxicity, into its component parts without the production of noxious emissions. SCWO is a highly efficient and effective organic waste treatment process; process reaction times measured in seconds and treatment efficiencies are > 99.99%. WMF funding will essentially bridge the financial gap between a novel paradigm changing idea and a functioning EFF-GO prototype, at which point established private investment channels will become available to further develop and maximise the potential of SCWO.

In short, WMF funding support will facilitate the commercialisation of EFF-GO's organic waste minimisation and treatment concept, a concept that will change how society handles its organic waste treatment and provide society with a process that actively eliminates the Persistent Organic Pollutants, microplastic particles and pathogens associated with municipal sewage sludges and industrial organic wastes and all without noxious gaseous emissions. With the international market for wastewater treatment estimated to be > \$90bn by 2022 the WMF could be the initiator of significant international earnings for New Zealand when EFF-GO's IP is leased overseas.

The EFF-GO process is a disruptive process, it will change the market, it will face resistance from the existing organic waste treatment industry, but it does offer a superior treatment option for NZ and will require the initial support of WMF funding to transition from concept to prototype.

## 2. Contact details for this application

Primary contact name	Simon Jury	Backup contact name	Damian Buckley
Organisation	EFF-GO Ltd	Organisation	EFF-GO Ltd
Role or job title	Director	Role or job title	Director
Phone	n/a <i>Landline</i> +64 21 304 009 <i>Mobile</i>	Phone	n/a <i>Landline</i> +64 27 288 9024 <i>Mobile</i>
Email address	simon_jury@hotmail.com	Email address	damianb@xtra.co.nz
Physical address	98 Oxford St, Ashhurst 4810	Physical address	3/1105 Kaipaki Rd, RD3 Cambridge 3495
Postal address	as above	Postal address	as above

## SECTION B: Project details

See pages 15 and 16 of the Guide for Applicants for information on how to complete this section.

### 3. Details of project

Project name	EFF-GO Prototype - a 21st century solution for 21st century waste
Project description <i>This should be a short and succinct description of the problem, solution and outcome your project will achieve.</i>  <i>You will have the opportunity to expand on this description later in the application form. (approximately 100 words)</i>	<p>New Zealand is without an effective and sustainable treatment option for its municipal sewage sludges, the current options of landfill and composting have significant faults that render them unsustainable. Landfill has capacity and leachate issues. Composting municipal sewage sludge is the dilution of pollution, as POPs, plastic particles and heavy metals remain untreated by the compost process. Over time these untreated fractions bioaccumulate and render the composted area polluted.</p> <p>The EFF-GO process is a full-stop solution, all organic matter is rendered inert and inorganics made recoverable. New Zealand will have a sustainable solution for its municipal sewage sludge and other recalcitrant organic waste streams.</p>
Project location <i>For example, Hawke's Bay, Auckland, Canterbury, Nationwide.</i>	Manawatu

Are you aware of any similar waste minimisation activities in your region?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>If yes, give details of the existing activity. Funding is not available for projects that displace existing activity.</i>
Project type <i>tick one project type that most closely fits your project</i>	<input checked="" type="checkbox"/> Feasibility or investigative <input type="checkbox"/> Infrastructure <input type="checkbox"/> Services <input type="checkbox"/> Education and awareness <input checked="" type="checkbox"/> Other <i>Please specify</i>
How many years are you seeking funding for? <i>One, two or three years</i>	One
Total project cost <i>What is the cash cost (exclusive of GST) of your project, including WMF funding, external funding, and your organisation's contribution?</i>	\$384,680.00
WMF contribution <i>How much funding (exclusive of GST) are you requesting from the WMF?</i>	\$368,680.00



If you are applying for a total WMF contribution of **\$200,000 or more** over the duration of your project, you **must** submit a business plan in support of your application. The business plan must be submitted as one document only. Your application **will not** be assessed without this information.

If you are applying for a total WMF contribution of **less than \$200,000** over the duration of your project, it is **optional** to submit a business plan in support of your application.

The business plan may include (but is not limited to) the following:

- **Background information about the organisation**  
*(including age and history of the company, information about directors and shareholders, staffing levels etc)*
- **Background information on your proposal**
- **Feasibility of your proposal**  
*(including details of any feasibility studies undertaken, technical expertise required and critical success factors)*
- **Financial summary**  
*(estimated budgets, what the funding will be used for, how much money is required to start the project and keep it running once it is established)*
- **Market analysis**  
*(including current and forecast supplier and end-user markets)*
- **Risk management strategy**  
*(risks to the successful delivery of the project and how these will be managed/mitigated)*

Please provide **only one** supporting document in pdf format for this section (5 MB file size limit).

#### 4. What waste stream will your project address?

Please select **one** waste stream only. If there is not a primary waste stream that your project will address, please indicate as 'other' and specify the multiple waste streams.

- PCBs (polychlorinated biphenyls)
- Timber (treated and non-treated – not readily able to separate)
- Primary sector related hazardous waste  
*(for example, tannery, wool scouring, factory wastes)*
- Manufacturing and services sector hazardous waste  
*(for example, aluminium processing waste)*
- Agrichemicals (including containers)
- Medical waste (excluding veterinary waste)
- Asbestos
- Contaminated soil
- Oil
- Refrigerants
- Biosolids
- Primary sector related organic waste
- Household organic (food waste and green waste)
- Paint

- Tyres
- E-waste
- Nappies and sanitary
- Commercial green waste
- Packaging – household and commercial  
*(for example, plastics, glass, cans, polystyrene)*
- Demolition materials – inert  
*(for example, concrete, steel, roading materials)*
- Paper and cardboard (household and commercial)
- Plasterboard
- Construction materials (for example, PVC, insulation, metal works, glass)
- Cleanfill
- Furniture
- Textiles
- Litter
- Other

Please Specify: The EFF-GO process is suited to the treatment of all organic wastes that can be dissolved or suspended in water, irrespective of toxicity and the resultant emissions will not be noxious. PCB's, municipal biosolids and industrial organic effluents are some examples of the waste types treatable by EFF-GO.

## SECTION C: Project outline

See pages 17, 18 and 19 of the Guide to Applicants for information on how to complete this section.

### 5. What is the problem that you plan to address with the project?

*Describe the nature and extent of the problem. Where applicable, include information on the harm or risk of harm that this problem creates, current waste quantities, and how the waste is managed, including method of disposal. Approx 200 words*

The treatment and uptake capacities of New Zealand's bio-sinks are being exceeded by the volume of organic matter generated by a flourishing human population and their associated activities in the primary, industrial and municipal sectors. This is evident by the now increasingly frequent warnings of our rivers, lakes and coastal waters being un-swimmable and the fact that our native aquatic/marine wildlife is struggling to exist in these same waters.

New Zealand has long cultivated and promoted a "Clean, Green New Zealand" image. An image now threatened by an absence of a coherent and sustainable mechanism to treat our increasing volumes of organic waste.

New Zealand needs a sustainable non-biological solution for its sewage sludges, EFF-GO offers such a solution.

EFF-GO will initially focus on the volume of municipal sewage sludge created by New Zealand's 323 listed municipal waste water treatment plants, which generate annually between 112,000t and 500,000t of municipal sewage sludge. EFF-GO in its mobile and static configurations, will offer these plants an outlet for their sludges. An outlet that eliminates the deleterious components of municipal sewage sludge, provides a full-stop solution and does so for less cost than the currently favoured and unsustainable composting and landfill options.

The EFF-GO process will also offer those 55 plants that are currently unconsented and the 87 that will have expired consents in the next decade a cost effective option to add to their consent application.

### 6. What is your proposed solution?

*How will your project address the problem, including specific actions? Where appropriate, include next steps after completion of the project..Approx 400 words*

Build the 80ltr prototype EFF-GO reaction chamber, utilising certified design drawings provided by Rhodes Engineering and a verifiable manufacturing source monitored by Sentinel Inspection. Confirm a plant process plan with Rhodes Engineering and purchase the "off-the shelf" ancillary equipment required to operate the EFF-GO process safely and efficiently. Sentinel Inspection will also oversee the plant assembly performed by the competent fitters recommended by Rhodes Engineering.

Companies such as Beta Solutions will be engaged to develop and install the PLC systems required for safe plant operation and control.

Written procedures will be developed for the operation of the plant and to train operators. This will be led by the Project Manager who will have a proven background in Chemical Engineering projects. Currently Dr Gaetano Dedual is the Project Manager of choice.

Commission and test the EFF-GO prototype against predetermined quantitative criteria; reaction chamber internals remain uncorroded and uneroded, salt-plugging doesn't occur, treatment efficiency is > 99.99%, process rates > 3ltrs/sec; and have the test results independently verified. Massey University has expressed an interest in performing this function.

Write a report in conjunction with Massey University documenting results, capturing learnings and identifying future development needs to further optimise the process.

Having demonstrated that the prototype works private investment will be sort to first make the prototype into a containerised and thus mobile treatment process, then into a larger static plant. The mobile configuration will service New Zealand's rural Wastewater Oxidation Ponds and the static configuration will be offered to the 4 New Zealand Wastewater Treatment Plants which generate over 9,000t of sewage sludge per year; Mangere, Ashburton, PNCC Totara Road and Rotorua.

It is perfectly feasible that by 2030 landfilling and composting of municipal sewage sludges will no longer be required in New Zealand. This will represent an annual reduction in waste to landfill > 112,000t and it will preserve landfill capacity for inert non-putrescible waste that is as yet unrecyclable and doesn't generate leachate. Adoption of the EFF-GO process will also remove a source of contamination from composting and thus prevent any future liabilities.

As uptake with the municipal sector grows EFF-GO will begin conversations with industry.

Ultimately New Zealand will have a powerful, cost effective, mobile and scalable reason to not put organic wastes in landfills.

## 7. Project objectives

Please provide between two and six concrete statements which describe the tangible results your project will achieve. Objectives must be achievable within the duration of the WMF funding.

<b>Objective</b>  <i>Objectives must be SMART (Specific, Measurable, Achievable, and Realistic within the Timeframe of the project)</i>	<b>How will you monitor and evaluate the achievement of this objective?</b>  <i>How will you measure your progress and demonstrate that the objective has been achieved?</i>	<b>Baseline information</b>  <i>Describe the current situation, using the data you have available.</i>
Construct the EFF-GO reaction chamber as per the certified drawings prepared by Rhodes Engineering	Sentinel Inspection will oversee manufacturing to ensure compliance with the verified engineering design	Rhodes Engineering has converted concept drawings into an engineering design ready for independent verification. The design has been CFD modelled by Dr F Dolamore and it performs as predicted
A verified plant design by Rhodes Engineering, the purchase of ancillary components and their subsequent assembly	The Project Manager and Sentinel Inspection will oversee plant construction to ensure the verified design is followed by competent trades	Provisional process flow diagram developed detailing the location of the various ancillary components needs to be reviewed and validated by Rhodes Engineering
Commission and test the EFF-GO plant	Run the plant in progressive stages elevating pressure and temperature levels whilst monitoring the integrity of the system linkages; no leaks, sensors and controls functioning	All the ancillary items feeding waste to and from the EFF-GO reaction chamber are currently available components certified for use under such conditions
Test the treatment efficiency and process rates of the EFF-GO system using simulated waste then actual sewage sludge	Use of a synthetic sludge of known composition facilitates testing before use of actual sewage sludge, that will need to be characterised prior to testing	Sewage sludge has a COD of 6 to 90kg/m <sup>3</sup> and a site specific chemical composition. Use of a std synthetic sludge is logical prior to live trials
Independent oversight of the commissioning and testing process	Use of independent labs sent samples gathered independently of EFF-GO	Massey University are keen to collaborate in the testing of the prototype
Assess the effectiveness of the EFF-GO SuperCritical Water Oxidation management process	Disassemble the reaction chamber and have the internals independently assessed for evidence of wear, corrosion and erosion	If the the EFF-GO process is effective the reaction chamber will be insignificantly altered from its unused state

## 8. Project key tasks/activities

List the main tasks/activities that will be undertaken in the delivery of your project in chronological order. The achievements of these tasks and activities will be a primary measure for evaluating the project's success.

Project tasks/activities – Year 1	Project tasks/activities – Year 2 <i>(if applicable)</i>	Project tasks/activities – Year 3 <i>(if applicable)</i>
<ul style="list-style-type: none"> <li>• Independent verification of the drawings created by Rhodes Engineering</li> <li>• Verified manufacture of the EFF-GO reaction chamber</li> <li>• Confirm plant layout and have the design independently verified</li> <li>• Purchase the ancillary equipment</li> <li>• Assemble the EFF-GO processing plant to the verified design</li> <li>• Test the assembled plant to confirm it is operating within acceptable parameters</li> <li>• Run the plant to process simulated waste and evaluate findings</li> <li>• Run the plant to process real sewage sludge and evaluate findings</li> <li>• Scrutinise the EFF-GO reaction chamber, if no significant wear is found then the EFF-GO SuperCritical Water Oxidation management system will have been shown to be effective.</li> <li>• Write a report</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>

## 9. How much waste does your project propose to reduce, reuse, recycle or recover?

Do not double count tonnages. Please note, some projects may not divert waste (eg, feasibility studies). Enter N/A if this is the case.

	Baseline <i>How much waste are you currently diverting from landfill (per annum), if any?</i>	Forecast after project completion <i>Estimated diversion from landfill in the first year after project completion</i>
<b>Reduce</b> <i>To lessen the generation of waste, including by using products more efficiently, or by redesigning products. For a product, this includes lessening the generation of waste.</i>	0 tonnes	2,678 tonnes
<b>Reuse</b> <i>To use waste or diverted material (in its existing form) further, for the original purpose of the materials or products that constitute the waste or diverted material, or for a similar purpose.</i>	tonnes	tonnes
<b>Recycle</b> <i>To reprocess waste or diverted material to produce new materials.</i>	tonnes	tonnes
<b>Recover</b> <i>To extract materials or energy from waste or diverted material, for further use or processing (includes making compost).</i>	tonnes	tonnes
<b>Total</b>	<b>tonnes</b> <i>per year currently</i>	<b>2,678 tonnes</b> <i>per year after completion</i>

Please describe the source of tonnage data detailed above. If you are unable to provide tonnage figures for your project then please explain why.

The prototype reaction chamber will initially be offered to Shannon, Levin and Paraparaumu Wastewater Treatment Plants to treat their combined annual sewage sludge production volume of 2,678t. Following successful application to the needs of these outlets the use of the process will be offered to the other 323 Municipal Wastewater Treatment Plants and their combined annual sewage sludge volumes, which are reported by WaterNZ to be approx. 112,000t. Simultaneously the technology will be offered to the various New Zealand sources of industrial organic waste. The total volume of which is estimated to be at least of a similar scale to municipal sewage sludge.

Please describe how you will measure the amount of waste your project will minimise:

Known volumes of waste are drawn through the EFF-GO process, this volume therefore equates to the volume of waste eliminated from landfill and the contamination of green waste composting processes. The waste diversion efficiency of the EFF-GO process will be precisely recorded and independently verified as required.

## 10. What are the specific benefits that your project will deliver?

*Please outline the economic, environmental, social and/or cultural benefits that will result from the completion of your project.*

The unique design approach utilised by EFF-GO will facilitate the general application of the internationally recognised treatment process that is SuperCritical Water Oxidation (SCWO) to New Zealand's municipal sewage sludges and other recalcitrant organic matter waste streams. SCWO rapidly converts all organic matter in to benign products:

Organic Matter Solution + O<sub>2</sub> → CO<sub>2</sub>\* + N<sub>2</sub> or NH<sub>3</sub> (depending on temp) + H<sub>2</sub>O + Inorganic Salts (SO<sub>4</sub>+PO<sub>4</sub>, etc)

\*Subsequent iterations of the process will seek to sequester the CO<sub>2</sub> generated and create a circular market – see Figure 2 of the Business Plan

EFF-GO is a "Full-Stop" solution, organic matter passing through the EFF-GO reaction chamber is completely oxidised – it is effectively incineration in the liquid phase.

- Bacteria and viruses are destroyed
- Persistent Organic Pollutants (POP's), PCB's and Endocrine Disruptors are disassembled
- Inorganic components are concentrated and presented in a recoverable oxidised format
- The eutrophication potential of a treatment plants output is significantly reduced

New Zealand will be provided with a physiochemical treatment process for the various organic waste streams it currently either landfills, dilutes via composting or incinerates. The superior treatment efficiencies of the EFF-GO process, relative to existing bio-treatment processes, are estimated to be at least 7.5% (\$/t) cheaper than the market rates for current sewage sludge treatment options. This estimate doesn't include the value of the electrical energy which is recoverable from the high temperature and high pressure aqueous output from the EFF-GO reaction process. The EFF-GO process will help to protect New Zealand's "Clean Green" image and having demonstrated its worth in New Zealand the technology will be offered internationally to create a new source of foreign income and prestige for New Zealand.

## 11. How will you ensure the solution you are proposing endures, once WMF funding has ended?

*Please describe how the project will continue after the funding ends (ie, how will the project become self-sustaining?, how will the benefits continue once your project is completed?).*

5-year business forecasts, created under a variety of scenarios, indicate that the EFF-GO process will become financially self-sufficient within 3 to 5 years of successful prototyping. This is because EFF-GO offers treatment rates several orders of magnitude faster than bio-processes, superior treatment efficiencies of > 99.99%, due to the highly oxidative environment that is supercritical water and treatment costs lower than landfill, compost and incineration. EFF-GO will become self-sustaining because it will outcompete the current treatment options. EFF-GO is a market changing process, it is a 21st century solution for 21st century waste.



## 12. How will your project accelerate New Zealand's transition to a Circular Economy?

*Please describe how the project will contribute towards the movement towards a Circular Economy within New Zealand, or in a wider geographical context.*

*The EFF-GO process rapidly and effectively disassembles organic matter into its component parts, it is in essence a physiochemical detritivore. Consequentially the recycling of nutrients, through primary producer pathways is accelerated.*

*Following the successful prototyping of the EFF-GO process private investment funds will be sort to use the outputs of the EFF-GO reaction chamber; CO<sub>2</sub>, N<sub>2</sub>/NH<sub>3</sub>, H<sub>2</sub>O, inorganic salts and thermal energy; as the feedstock/promoters for algal farms. The output of the algal farms then going directly/indirectly in to the human food chain and/or to the biofuel/industry precursor sectors. In doing so EFF-GO becomes more than a highly efficient and effective organic waste destruction process, it becomes a conversion process that facilitates a closed loop, from sewage sludge, to organic building blocks via EFF-GO, which are in-turn presented to algae for recombination in to the human food chain, which then produces sewage sludge. Please see Figure 2 of the attached Business Plan for more details.*

*SuperCritical Water Oxidation (SCWO) has also been shown to be an effective inorganic extraction process for the recovery of rare earth and precious metals from printed circuit boards and other types of waste rich in such metals. In each ton of printed circuit boards there is approximately 400g of gold, additional quantities of rare earth metals are also present; tin, nickel, silver, etc. The printed circuit boards are shredded into particles < 200um and passed through the EFF-GO process. The body of the printed circuit board, composed of organic matter and glass fibres, is converted to CO<sub>2</sub>, SiO<sub>2</sub>, and the metals are concentrated in an inorganic sludge which can then be refined to recover the individual metals. The mining of landfills for such metals may even become financially viable.*

## 13. How will your project act as a catalyst to enhance and extend the uptake of waste minimisation?

*Please identify how your project will do the following:*

- implement the recommendations of the most recently published review of the effectiveness of the waste disposal levy (found [here](#)).*
- how your project aligns with and will help deliver any strategic outcomes that the Ministry has identified for this round. Strategic outcomes and investment signals can be found [here](#).*

*Having established the EFF-GO process as a sewage sludge treatment option the inclusion of food waste will be explored. The long-term vision for the EFF-GO process is for it to act as hub for organic waste treatment, the hub located at a Wastewater Treatment plant, municipal or industrial. As the EFF-GO process requires 10% (m/v) organic matter solution for autothermic operation it would use the untreated wastewater to create the diluted feed solution from the organic matter in need of processing. Food waste macerated into particle sizes < 200um can be suspended in the infeed solution and used to generate power whilst increasing the volume of untreated wastewater that can be handled by the EFF-GO process. Please see Figure 3 of the Business Plan for more details*

## SECTION D: Funding summary

See pages 21 to 24 of the Guide to Applicants for information on how to complete this section.

### 14. Outline project budget

Complete the table below with details of your estimated project costs (all costs should be GST exclusive). Project costs should reflect the tasks and activities set out in question 7. **The total amount for all years should be equal to the 'total project cost' provided in question 3.**

*If applicants do not attach a business please provide a detailed budget as a supporting document using the supplied template.*

Project cost category	Total estimated cost – Year 1	Total estimated cost – Year 2 <i>If applicable</i>	Total estimated cost – Year 3 <i>If applicable</i>
Personnel	\$75,000.00	\$0.00	\$0.00
Consultants and contractors	\$91,000.00	\$0.00	\$0.00
Administration	\$5,200.00	\$0.00	\$0.00
Purchase of capital assets and other capital costs	\$111,980.00	\$0.00	\$0.00
Venue and equipment	\$11,000.00	\$0.00	\$0.00
Travel and accommodation	\$12,000.00	\$0.00	\$0.00
Promotion and dissemination of information	\$10,000.00	\$0.00	\$0.00
Financial, legal and information technology (IT) expenses	\$6,000.00	\$0.00	\$0.00
Health and safety	\$62,500.00	\$0.00	\$0.00
Other miscellaneous costs	\$0.00	\$0.00	\$0.00
<b>Estimated TOTAL project cost for each year</b>	<b>\$384,680.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Estimated total project cost</b> <i>Add the totals of each column – this must equal the 'total project cost' provided in question 3)</i>	<b>\$384,680.00</b>		

## 15. Funding sources

Complete the table below (all figures should be GST exclusive). **The total from all funding sources MUST equal the estimated Project Costs in question 14.** Only include funding that you have applied for, and is either approved or still pending (ie, not declined).

<b>Organisation details</b> <i>If you have secured further funding from more than four organisation(s), provide the amount in the contribution to project column to the right. Provide information about the organisation's name, contact details, status of offer, and dates in a separate document, and submit this as supporting information with your application.</i>	<b>Contribution to project – Year 1</b>	<b>Contribution to project – Year 2</b> <i>If applicable</i>	<b>Contribution to project – Year 3</b> <i>If applicable</i>
Cash contribution from your organisation	\$16,000.00	\$0.00	\$0.00
External funding source 1 <i>Name and contact details:</i>	\$0.00	\$0.00	\$0.00
External funding source 2 <i>Name and contact details:</i>	\$0.00	\$0.00	\$0.00
External funding source 3 <i>Name and contact details:</i>	\$0.00	\$0.00	\$0.00
External funding source 4 <i>Name and contact details:</i>	\$0.00	\$0.00	\$0.00
Amount requested from the WMF	\$368,680.00	\$0.00	\$0.00
<b>TOTAL funding from all sources for each year</b>	<b>\$384,680.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Total of all funding sources</b> <i>Add the totals of each column – this must equal the 'total project cost' provided in question 14</i>	<b>\$384,680.00</b>		

*If any of the funding for your project is not yet confirmed, please provide a summary here of how much is 'pending' and when you expect this to be secured.*

## SECTION E: Capability

See pages 25 and 26 of the Guide to Applicants for information on how to complete this section.

### 16. Project manager details

The project manager is the person responsible for managing major project tasks/activities, and is likely to be the person who liaises with the Ministry if the project is funded.

Complete the table below, if you have already nominated a project manager. If you have not appointed a project manager yet, what skills and experience will they be required to have?

Name	Dr Gaetano Dedual
Organisation	RECES
Role or job title	Consulting Chemical Engineer
Email address	gdedualmail@gmail.com
Phone	Landline +64 27 697 8185 Mobile
Skills and experience (relevant to the successful delivery of this project)	

### 17. Governance and management structure

<p><b>Project governance</b></p> <p><i>Include information about how your project will be governed. Include how the governance group will monitor and manage any slippage on project progress.</i></p>	<p>EFF-GO's Board of Directors will provide Project Governance against a project plan, previously agreed with the Project Manager. Where slippage occurs solutions will be workshopped and implemented in a collaborative manner, without compromising the safety of those involved or the quality of the data gathered. Minuted progress review meetings will be held weekly.</p>
<p><b>Managing funds</b></p> <p><i>Provide information about how you will manage the project funds if successful. Include information about how you will procure goods and services, approve payments, and monitor and address budget overspend.</i></p>	<p>EFF-GO Ltd currently utilises the accounting services of Naylor Lawrence and Associates Ltd, they will act as Fund Managers for the project. On a monthly basis EFF-GO and the Project Manager will hold minuted meetings with Naylor Lawrence to track finances against budget.</p> <p>Procurement will be from the EFF-GO business account and as such it requires the approval of the Board of Directors.</p> <p>In the unlikely event of project overspend the EFF-GO Board of Directors will meet these costs.</p>

## 18. Partnership and collaboration

Provide details of organisations that you will be partnering with in the **delivery** of this project (this may include territorial authorities). Please provide a letter from each of the project partners outlining the nature of their involvement and what they will contribute to the successful delivery of the project.

Organisation name	<b>Contact person</b> <i>Name, phone number and email</i>	Details of involvement
Massey University	Dr Gavin Clark <i>Name</i> +64 (06) 356 9099 <i>Phone</i> G.Clark@massey.ac.nz <i>Email</i>	Source of specialist project advice. Gavin Clark is the Enterprise Dean at Massey University and will provide a conduit to specialist advice as required as the project proceeds
	<i>Name</i>  <i>Phone</i>  <i>Email</i>	
	<i>Name</i>  <i>Phone</i>  <i>Email</i>	
	<i>Name</i>  <i>Phone</i>  <i>Email</i>	
	<i>Name</i>  <i>Phone</i>  <i>Email</i>	

## 19. Publicly-funded projects

In the past 5 years, have you received funding from the Ministry for the Environment (or other organisations)?

Yes       No

If yes, please complete the table below for each project you have received funding for.

Name of fund	<b>Contact person</b> <i>Name, phone number and email</i>	Amount received	Details of project
Callaghan Innovation Getting Started Grant	Peter Ellingham <i>Name</i>  +64 27 934 4586 <i>Phone</i>  peter.ellingham@c eda.nz <i>Email</i>	\$5,750.00	Novelty and Freedom to Operate Reports. EFF-GO has sufficient novelty to be patentable as a process and it has freedom to operate in New Zealand, Australia and the USA.
	<i>Name</i>  <i>Phone</i>  <i>Email</i>	\$0.00	
	<i>Name</i>  <i>Phone</i>  <i>Email</i>	\$0.00	
	<i>Name</i>  <i>Phone</i>  <i>Email</i>	\$0.00	
	<i>Name</i>  <i>Phone</i>  <i>Email</i>	\$0.00	

## 20. Health and safety

*It is important that you have the necessary health and safety policies, resources and expertise to safely undertake and complete the project. You will be asked to submit a health and safety plan if you are invited to proceed to Stage II*

<p>Does your organisation have a health and safety policy?</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><i>If Yes, please state when this was last reviewed/updated.</i></p> <p>24/05/19</p>
<p>Has your organisation been issued with any notices under the Health and Safety in Employment Act 1992? <i>(or any replacement to this Act)</i></p>	<p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p><i>If Yes, please provide details.</i></p>
<p>Who will be responsible for health and safety for the project?</p>	<p>Simon Jury BSc(Hons) MSc Dip OHS</p>

## 21. Environmental compliance

<p>Do you require any statutory permissions to complete the project? <i>For example, resource management, building, planning, Basel or other consents?</i></p>	<p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>If yes, which permission(s) are required? Have you applied for these? If so, when is a decision expected (if known)?</p>
<p>Has your organisation received any infringement or abatement notices or been subject to any prosecutions under the Resource Management Act 1991 during the past 5 years?</p>	<p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p><i>If Yes, please provide details.</i></p>

## SECTION F: Additional information

### 22. Conflict of Interest

*It is important that conflicts of interests, whether actual or perceived are managed appropriately. If you have a conflict of interest management plan, you will be asked to submit this if you are invited to Stage II.*

Do you have any perceived or actual conflict of interests in relation to this project?

Yes

No

*If Yes, please state the nature of this conflict of interest and how it will be managed.*

Does your organisation have a conflict of interest management plan/policy?

Yes

No

*If Yes, please state when this was last reviewed/updated.*

### 23. Is there anything else we need to consider about your application?

*This space is for you to provide any additional information that your organisation considers important, but has not been covered in previous sections of this application form, for example support for your project (eg, from territorial authorities).*



## 24. Referees

The referees specified below will be contacted as part of the due diligence and reference checks undertaken if the application is invited to Stage II of the WMF funding process.

<b>First referee name</b>  <i>External referee for the person who will have the overall responsibility for delivering this project</i>	Peter Ellingham	<b>Second referee name</b>  <i>External referee for the organisation. This person must have worked with your organisation before</i>	Britta Fromow
<b>Organisation</b>	CEDA	<b>Organisation</b>	Catalyst IP
<b>Role or job title</b>	Business Growth Advisor R&D	<b>Role or job title</b>	Partner - Mechanical Engineering, Electronics & Designs
<b>Phone</b>	+64 6 350 1834 <i>Landline</i> +64 27 934 4586 <i>Mobile</i>	<b>Phone</b>	+64 4 550 2394 <i>Landline</i> +64 21 464 378 <i>Mobile</i>
<b>Email address</b>	peter.ellingham@ceda.nz	<b>Email address</b>	britta.fromow@catalystip.co.nz
<b>Physical address</b>	Central Economic Development Agency  Level 1, The Square Centre Building  478 Main Street East  Palmerston North	<b>Physical address</b>	CatalystIP  Level 5, 45 Johnston Street  Wellington 6011  New Zealand

## Declaration

*This declaration must be completed by a person with the organisation's signing authority. See the guide for additional information on how to complete this question.*

**Important:** Please contact the Ministry if you have any queries about the terms and conditions of the Deed of Funding for the Waste Minimisation Fund.

As a duly authorised representative of the organisation as per Section A of this Waste Minimisation Fund application form:

- I declare that my project meets all of the eligibility criteria for the Waste Minimisation Fund (*see page 3 of the application form*)
- I declare that to the best of my knowledge, the information contained in all sections of this application form, or supplied by us in support of our application, is complete, true and correct.
- I declare that I have the authority to sign this application form and to provide this information.
- I declare that the application is not being made by an organisation that is in receivership or liquidation, or by an undischarged bankrupt.
- I declare that I have provided information relating to any actual or potential conflicts of interest (in question 20) and that I will promptly inform the Ministry for the Environment of any such conflicts if they arise subsequent to the submission of this application.
- I understand that information presented to the Minister for the Environment and Ministry for the Environment is subject to disclosure under the Official Information Act 1982, other legislation, court orders and in response to Parliamentary questions.
- I understand my rights in accordance with the Privacy Act 1993
- I agree that the Ministry for the Environment may collect information including but not limited to credit checks, criminal record checks and reference checks about our organisation from other parties, (including but not limited to the referees named in Section F of this application), and may liaise with local and national organisations in respect of this application.
- I understand that an invitation to proceed to Stage II of the funding process is not a confirmation of funding, and that the final decision is subject to the successful completion of Stage II.

**Name**

Simon Jury BSc(Hons) MSc Dip OHS

**Position**

Director, EFF-GO Ltd

**Signature**

*By typing your name in the space provided you are electronically signing this application form.*

Simon Jury

Date 26/05/19

## Checklist

Use the following checklist to confirm you have provided all the required information in your application.

**Do not include any attachments that the Ministry has not specifically requested. These will not be provided to the assessment panel.**

- All sections of this application form have been completed.
- Declaration has been electronically signed and dated.
- All \$ figures provided add up and are consistent throughout the application (*ie, the total estimated project costs in question 12 must equal the funding sources in questions 13*)
- Business plan has been included as one document only with a maximum file size of 5 MB (*this is **mandatory** for applications requesting WMF funding of \$200,000 or more*)
- Detailed budget included *for all applications without a business case*
- Letters to support involvement from each of the partner organisations listed in question 16 are attached.
- Application form, business plan (one document) and any letters from partners will be submitted as **one email only** (documents submitted as multiple emails will not be accepted).