



CRITERIA FOR CERTIFICATION
ENVIRONMENTAL INNOVATION, GS-20 Edition 2.0
Sub-Category: Industrial Temporary Heating, Power Generation, and Lighting

APPLICANT INFORMATION:	
Company:	Thermal Intelligence
Product Name:	Basecamp and Basecamp XL Smart 3-in-1 Heater, Light Tower, and Generator
Website:	https://thermalintelligence.com

Introduction. Green Seal’s Environmental Innovation Standard (GS-20) provides a framework for the certification of environmental innovations. This certification demonstrates that an independent third party has verified the innovative aspect(s) of a product results in a significant reduction of human health and environmental impacts compared to products of the same functional class, achieving innovations not previously demonstrated within a product category. Certification neither constitutes the development of a product category standard or benchmark, nor does it require competitors within a product category to use the same innovation strategies in their approach to claiming innovation.

Certification of Environmental Innovation. If the applicant can demonstrate the product conforms to all criteria within this document, Green Seal will provide a Certification of Environmental Innovation.

Innovation Claim. The applicant states that the products Basecamp and Basecamp XL Smart 3-in-1 Heater, Light Tower, and Generator achieves an estimated 50-66 percent reduction in operating fuel use than a comparable generator/generator-heater combination, to achieve the same power output. This 50-66 percent gain in fuel use efficiency is possible through a patent-pending system design to efficiently power both its generator and blower, allowing for simultaneous delivery of heating, lighting, and electric power, and results in a emissions reduction of an estimated 209 metric tons of CO₂e per year.

Disclaimer. This Certification is not intended to identify all possible negative impacts and cannot rule out any unknown negative consequences from the use of this product.

Definitions. Words and phrases described in the standard that appear in italics have a corresponding definition located in the definition section of the Green Seal Standard for Environmental Innovation, GS-20, Annex A.

Public Comment. A public comment period on the Draft Criteria will be held from April 23, 2021 to May 24, 2021.

OVERVIEW

1.0 Eligibility

The products Basecamp and Basecamp XL Smart 3-in-1 Heater, Light Tower, and Generator by the company Thermal Intelligence are eligible to be certified under the Environmental Innovation Standard (GS-20, Edition 2.0) because the products:

1. Are commercially available.
2. Exist within a market that has comparable options that achieve the same function, and
3. Have lifecycle phases for which there exist published health and environmental impact information from credible sources.

Product Function

When used as intended the product provides up to 3 functions simultaneously: 1) electric power generation, 2) temporary heating, and 3) lighting. The product is typically used in construction, restoration/remediation, and equipment pre-heating/thawing. The fuel source used to power the product is diesel fuel.

Comparable Alternatives (Primary Function: Electricity Generation)

Comparable products include portable medium powered generators fueled by diesel, able to produce various electricity levels, depending on the size of the generator.¹ Portable generators similar to Basecamp and Basecamp XL produce 20-50 kW of electric power. Additional comparable products include portable generator and indirect flamed heater combinations, which provide electric power and heat.

Additional Functions: Temporary Heating and Lighting

Basecamp and Basecamp XL also provide integrated heating, comparable to standalone flameless heaters (fuel source diesel) or indirect flamed heaters (fuel source diesel or propane) and integrated lighting, comparable to standalone lighting towers (fuel source generated electricity) used on construction job sites.

Legal Compliance

Manufacturer shall not be in violation of any applicable environmental regulations or laws nor any applicable regulations under the authority of the U.S. Federal Trade Commission or the U.S. Environmental Protection Agency (or equivalent if based outside the United States).

¹ <https://www.wpowerproducts.com/news/how-construction-sites-get-power/>

2.0 Product Lifecycle Impact Review

This section documents the anticipated human health and environmental lifecycle impacts associated with heating, power generation and/or lighting heavy equipment for industrial use, noting the most significant (i.e., greatest in negative effect) impacts.

Summary of Lifecycle Impact Review

Lifecycle Phase	Significant Impacts Identified
Resource Extraction	Degradation of local air and water quality and soil health associated with the extraction of resources used to create typical product components such as cast iron, alloy and structural steels, aluminum alloys, brass, copper, fiberglass, etc.
Manufacturing	Local air and water quality degradation from process emissions associated with product manufacturing.
Use	Greenhouse gas and air pollutant emissions from fuel used to power equipment, creating negative human health and environmental impacts.
Waste Management and Disposal	No significant impacts identified.

Resource Extraction Phase

Heating, lighting, and power generation equipment typically requires the extraction of raw materials used to create product components such as cast iron, alloy and structural steel, aluminum, brass, copper, fiberglass and other such components. The production of each of these components results in significant impacts to the local environment.

According to the American Geosciences Institute,² “operations and waste products associated with metal extraction and processing are the principal causes of environmental concerns about metal mining” and are broadly categorized as:

- Physical disturbances to the land
- Soil and water contamination
- Air contamination
- Public safety

For example, aluminum is produced through the extraction of bauxite; the opencast mining process used to extract bauxite can seriously damage local ecosystems and communities and has significant residue storage needs that demand extensive land use and can create sludge spills in local communities.³ Iron ore extraction (used to produce steel) also occurs within opencast mines, creates similar disturbances to land, creates soil, water, and air contamination.

According to the American Geosciences Institute, “as the amount of waste rock in open pit mines is commonly two to three times the amount of ore produced, tremendous volumes of waste rock are removed from the pits and deposited in areas nearby. Waste piles from processing, such as tailings impoundments, leach piles, and slag piles vary in size, but can be very large. The impoundments associated with some of the largest mills, such as at open pit copper mines, can cover thousands of acres (tens of km²) and be several hundred feet (about 100 m) thick.”⁴

² <https://www.americangeosciences.org/critical-issues/faq/how-can-metal-mining-impact-environment>

³ <https://www.greenspec.co.uk/building-design/aluminium-production-environmental-impact/>

⁴ <https://www.americangeosciences.org/critical-issues/faq/how-can-metal-mining-impact-environment>

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Manufacturing Phase

In general, the materials that comprise construction products such as generators, lighting equipment, and heaters require manufacturing processes that are energy and water intensive, and result in the release of hazardous emissions and effluents.

According to GreenSpec⁵, “steel production has a number of impacts on the environment, including air emissions (CO, SO_x, NO_x, PM2.5), wastewater contaminants, hazardous wastes, and solid wastes” with coking and iron making contributing the largest environmental impacts from integrated steel mills. In addition, contaminants created through the coke cooling process enter the local waterways of steel production facilities, resulting in local water quality degradation and negative impacts to aquatic life. The steelmaking process is very energy intensive, with “virtually all greenhouse gas emissions” from steel production coming from “carbon dioxide emissions related to energy consumption.” In fact, according to the International Energy Agency (2010), 6.5% of global CO₂ emissions come from the production process of iron and steel.

Similarly, aluminum production requires high amounts of energy use during the production phase and the smelting process requires large amounts of water. During processing, large amounts of air and water emissions occur, some of which are hazardous.⁶ Similar impacts generally result from the production of other components used in generators, heaters, and powered lighting equipment.

Use Phase

Construction activities represent a significant contributor of greenhouse gas emissions. According to the U.S. EPA, the construction sector produced 6% of total U.S. industrial GHG emissions in 2002; or 131 million metric tonnes of CO_{2e} annually.⁷ Within this figure, over 88 million metric tonnes of CO_{2e} (over 75% of the total emissions) comes from fossil fuel combustion, including emissions from on- and off-highway construction vehicle combustion of gasoline and diesel fuel, natural gas combustion for office power, heating and tools, and diesel used for generators.⁸

As is well documented by the scientific community, “greenhouse gas emissions have far-ranging environmental and health effects. They cause climate change by trapping heat, and they also contribute to respiratory disease from smog and air pollution. Extreme weather, food supply disruptions, and increased wildfires are other effects of climate change caused by greenhouse gases.”⁹

In addition to greenhouse gas emissions, diesel powered equipment creates air pollutant emissions which can create a negative human health impact for on-site workers exposed to pollutant emissions. These pollutants include PM10 (which penetrates deeply into the lungs and cause a wide range of health problems including respiratory illness, asthma, bronchitis and even cancer), carbon monoxide, hydrocarbons, nitrogen oxides and carbon dioxide.¹⁰

⁵ <https://www.greenspec.co.uk/building-design/steel-products-and-environmental-impact/>

⁶ <https://www.greenspec.co.uk/building-design/aluminium-production-environmental-impact/>

⁷ Emissions calculated for Sector Strategies, based on the U.S. Department of Energy (DOE) 2002 Manufacturing Energy Consumption Survey and EPA’s Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. U.S. Department of Energy, Energy Information Administration (EIA), 2002 Manufacturing Energy Consumption Survey, 2005. U.S. Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006, 2008.

⁸ U.S. Environmental Protection Agency. *Potential for Reducing Greenhouse Gas Emissions in the Construction Sector*. February 2009; page 9. <https://archive.epa.gov/sectors/web/pdf/construction-sector-report.pdf>

⁹ <https://www.nationalgeographic.com/environment/article/greenhouse-gases>

¹⁰ <http://www.sustainablebuild.co.uk/pollutionfromconstruction.html>

Waste Management and Disposal Phase

No significant impacts identified.

CERTIFICATION REQUIREMENTS

3.0 Environmental Innovation Review

This section details the applicant's proposed innovation claims including:

- Innovation Summary: describes how the applicant claims the product differs from comparable products on the market,
- An Impact Reduction Statement: describes how the applicant claims their product's innovation results in reductions of significant lifecycle impacts identified in the Product Lifecycle Impact Review (Section 2.0 herein),
- Market Analysis: describes the parameters for the applicant to demonstrate their claim that the product is the first and only product of its type to achieve this innovation during the Certification Phase, and
- Drawbacks Analysis: a summary of any potential drawbacks that Green Seal has identified and mitigations necessary.

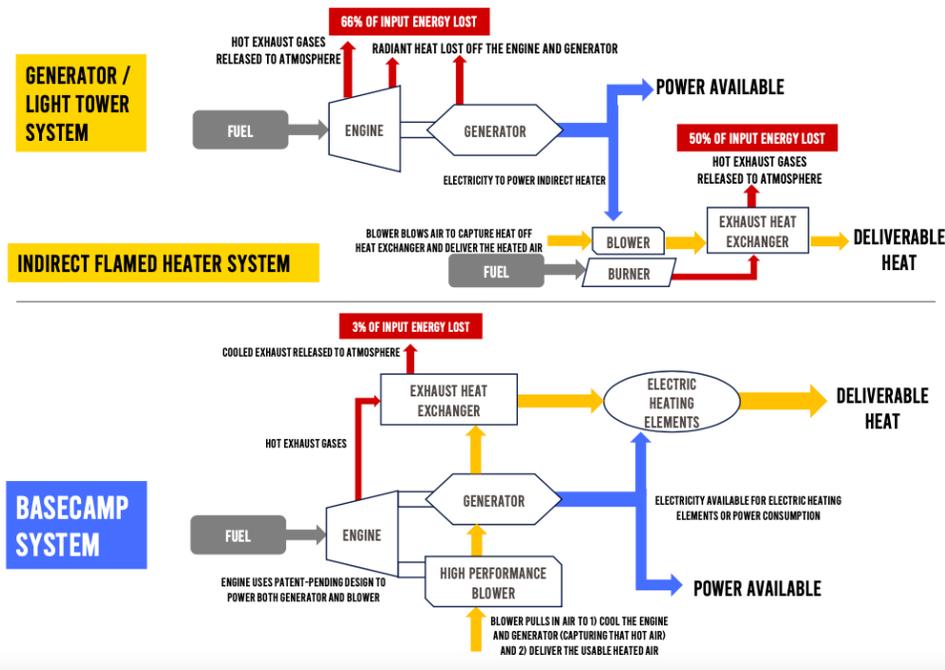
The applicant is pursuing Certification of Environmental Innovation through Option 1: Improved Design: Demonstrate a minimum of 30% reduction of one or 20% in each of two or more significant environmental or human health impacts, as identified in Section 2.0.

3.1 Innovation Summary

The applicant states that the products Basecamp and Basecamp XL Smart 3-in-1 Heater, Light Tower, and Generator achieves an estimated 50-66 percent reduction in operating fuel use than a comparable generator/generator-heater combination, to achieve the same power output. This 50-66 percent gain in fuel use efficiency is possible through a patent-pending system design to efficiently power both its generator and blower, allowing for simultaneous delivery of heating, lighting, and electric power.

- Basecamp provides heat and light comparable two indirect flamed heaters and one light tower.
- Basecamp XL provides heat and light comparable to three indirect flamed heaters and one light tower.

The graphic below illustrates how Basecamp and Basecamp XL's engine design technology allows for the capture of two-thirds of the heat which is typically lost, in the case of comparable products, as exhaust or radiant heat. The captured heat is then converted back into electricity, converted into light, converted into heat, or a combination of those functions. During the Certification Phase, Green Seal will verify these claims through a technical review.



3.2 Impact Reduction Summary

Through this innovation, the applicant states that Basecamp and Basecamp XL achieve an estimated 50-66 percent reduction in operating fuel use, which saves an estimated 209 metric tons of CO₂e per year, calculated when used at full capacity for 180 days of use.

Specifically, Basecamp and Basecamp XL’s patent-pending system design produces the same energy output using 57 gallons of diesel fuel for which a comparable generator and heater combination would require 171 gallons of diesel fuel.

During the Certification Phase, Green Seal will verify these claims through a technical review.

3.3 Mitigates Burden Shifting

The Drawbacks Analysis explored whether the Basecamp and Basecamp XL require significantly more materials (and additional impacts to the Resource Extraction and Manufacturing Phases) in order to achieve the greenhouse gas emissions reductions associated with the Use Phase. Weight was used as the metric in this analysis.

- Basecamp (with a 27kWh generator) has a dry weight of 3,500 pounds, including the trailer
- Basecamp XL (with a 48kWh generator) has a dry weight of 7,000 pounds, including the trailer
- Three similar generators reviewed weigh between 2,600 pounds (generator only) to 4,200 pounds (including a trailer)
- Three similar indirect flame heaters reviewed weigh between 420 – 660 pounds
- Three similar light towers reviewed weigh between 970 -1,460 pounds

Based on the above information, both Basecamp and Basecamp XL are of similar weight to the comparable products they replace:

- Basecamp: one generator, two indirect flamed heaters and one light tower
- Basecamp XL: one generator, three indirect flamed heaters and one light tower

As a result of a drawbacks analysis, Green Seal has not noted any *burden shifting* resulting from this product innovation. No mitigation is necessary.

3.4 First to Market

An initial market analysis conducted in February 2021 shows that there are no other products on the market that provide integrated heat, light, and power generation for use on a construction site. During the Certification Phase, applicant shall provide evidence that the product is the first and only combined heat, light, and power generator available on the US market and can achieve an estimated 50-66 percent reduction in operating fuel use than a comparable portable generator and indirect flamed heater combination.

4.0 Evaluation of Functional Performance and Fitness for Purpose

This section details the requirements to demonstrate that the applicant product functionally performs as well as or better than at least one nationally recognized or market leading product of its type, to be approved by Green Seal, including test methods and test reports to submit during the Certification Phase.

4.1 Test Methods

Applicant shall meet the requirements in this section to demonstrate the product functionally performs at least as well as or better than at least one nationally recognized or market leading product of its type, to be approved by Green Seal. When industry standard data is unavailable, the applicant shall use objective, scientifically validated testing methods conducted under controlled and reproducible laboratory conditions to demonstrate functional performance along the following parameters:

- **Engine Life** in Hours compared to a portable medium powered diesel fueled electric power generator of similar kWh
- **Heat Output** in BTUs compared to two (for Basecamp) or three (for Basecamp XL) indirect flamed heaters designed to perform similar scale tasks
- **Light Output** in Lumens compared to the brightness of standalone job site light tower

5.0 Environmental and Human Health Requirements

This section describes the Environmental and Human Health requirements with which the applicant product must demonstrate compliance. Green Seal uses the following factors to determine requirements for this section:

- **Product Form:** the applicant product is assembly of parts.
- **Potential for Direct Human Exposure:** through regular handling and use of the product, the potential for inhalation, ingestion, or absorption is not present.
- **Potential for Environmental Releases:** as described in herein, when the product is used as intended, the product emits air pollutants and greenhouse gases.

See section 5.21 for additional requirements to address air pollutant emissions associated with diesel engines.

5.1 Disclosure

Applicant shall disclose all product parts through a Bill of Materials, including the part name, type (e.g., raw material, assembly, sub-assembly, component), part function, and material type (e.g., steel, aluminum, resin, nylon, etc.).

5.2 Carcinogens, Mutagens, and Reproductive Toxins.

The product shall not contain any *components* that are *carcinogens, mutagens, or reproductive toxins*. An exemption may be made if the component is critical for product function.

5.3 Prohibited Components.

The product shall not contain the following *components*. An exemption may be made if the *component* is necessary for product function and no likely *exposure pathway* exists. Green Seal maintains the discretion to add relevant, scientifically valid prohibitions on a case-by-case basis.

- 1,2-dichlorobenzene
- 2-butoxyethanol
- Alkylphenol ethoxylates
- Formaldehyde donors
- The heavy metals lead, mercury, cadmium, hexavalent chromium, and antimony in the elemental form or compounds
- o-Phenylphenol
- Neonicotinoid pesticides
- Nitro-musks
- Phthalates
- Polycyclic musks
- Triclosan
- Triphenyl tins and tributyl tins

5.21 Product-Specific Requirements

Applicant shall demonstrate compliance with the following requirements:

5.21.1 Demonstrate compliance with CARB Tier 4 Final Emissions Standard¹¹ by providing emissions data and Tier 4 compliance documentation.

5.21.2 Demonstrate compliance with the Clean Air Act by providing a U.S. EPA Certificate of Conformity.

5.2.3 Applicant shall provide an attestation letter declaring that the product

- Is designed to have a weight consistent with other products of this type available on the market that would achieve the same output.
- Is designed only with materials consistent with other products of this type on the market.
- Use of the product does not result in detrimental effects to human health or the environment above and beyond comparable products of this type on the North American market.

6.0 Packaging Requirements

Basecamp and Basecamp XL are not sold in or with packaging; therefore, the requirements in this section do not apply.

7.0 Certification Requirements

Applicant shall meet all certification requirements described herein.

7.1 Certification Term

¹¹ CARB Tier 4 compliant engines significantly reduce emissions of particulate matter (PM) and oxides of nitrogen (NOx) to near zero levels. Relative to previous emissions standards, Tier 4 compliant engines reduce emissions by over 95 percent for most agricultural and construction equipment. <https://www.dieselforum.org/policy/tier-4-standards>

The initial Certification Term shall be 4 years. After the Certification Term, the applicant has the option to undergo Recertification.

7.2 Site Visit

The applicant shall undergo a site audit of product manufacturing facilities that includes verifying product characteristics and quality manufacturing processes.

Sections 7.3 to 7.6 Labeling Requirements for Products Sold as Liquids

Basecamp and Basecamp XL are not products sold as liquids; therefore, the requirements do not apply.

7.7 Certification Mark

The Green Seal® Certification Mark may appear on the product, secondary documents, and promotional materials, only in conjunction with the certified product. Use of the Mark must be in accordance with Rules Governing the Use of the Green Seal Certification Mark.

The Green Seal Certification Mark shall not be used in conjunction with any modifying terms, phrases, or graphic images that might mislead consumers as to the extent or nature of the certification.

Green Seal must review all uses of the Certification Mark prior to printing or publishing.

7.8 Use with Other Claims

The Green Seal Certification Mark shall not appear in conjunction with any human health or environmental claims unless verified and approved in writing by Green Seal.

7.9 Statement of Basis for Certification

Wherever the Green Seal Certification Mark appears, it shall be accompanied by a description of the basis for certification. The description shall be in a location, style, and typeface that are easily readable. If online space is limited, a link to the basis of certification may be used. Green Seal shall develop a statement of basis for certification for each product:

“[Name of product] is certified by Green Seal® for Environmental Innovation based on [details on basis for environmental innovation]. GreenSeal.org”

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ANNEX A (Environmental and Human Health Requirements that Do Not Apply)

5.4 Volatile Organic Compounds

No inhalation exposure pathway present; this requirement does not apply.

5.5 Animal Testing

Not relevant to applicant; this requirement does not apply.

5.6 Acute Toxicity

No inhalation or ingestion exposure pathway present; this requirement does not apply.

5.7 Skin and Eye Damage

No dermal exposure pathway present; this requirement does not apply.

5.8 Asthmagens

No inhalation exposure pathway present; this requirement does not apply.

5.9 Respiratory Sensitization

No inhalation exposure pathway present; this requirement does not apply.

5.10 Skin Sensitization

No dermal exposure pathway present; this requirement does not apply.

5.11 Skin Absorption

No dermal exposure pathway present; this requirement does not apply.

5.12 Chronic Inhalation Toxicity

No inhalation exposure pathway present; this requirement does not apply.

5.13 Combustibility

The applicant product is an article; this requirement does not apply.

5.14 Fragrances

The applicant product does not contain fragrances; this requirement does not apply.

5.15 Colorants

The applicant product does not contain colorants; this requirement does not apply.

5.16 Bioaccumulating Compounds

No environmental release exposure pathway present; this requirement does not apply.

5.17 Eutrophication

No environmental release exposure pathway present; this requirement does not apply.

5.18 Aquatic Biodegradability

No environmental release exposure pathway present; this requirement does not apply.

5.19 Toxicity to Aquatic Life

No environmental release exposure pathway present; this requirement does not apply.

5.20 Bleaching

The applicant product does not use a bleaching process; this requirement does not apply.