

# Deep Space Food Challenge

Application form - Canada

Thank you for applying for the Deep Space Food Challenge. Please read the Applicant Guide for Phase 1 in full, to assist you in filling out this form. It should be noted that the Applicant Guide contains very important and mandatory background information on eligibility to receive prizes and on the overall and performance criteria from which submissions will be judged.

You must answer all fields as indicated and complete all three mandatory sections of the application form. Your application may not be considered if it is incomplete. The survey (Section 4) is optional.

Note: You will be able to save your application form and continue at a later time.

All applications must be received no later than July 30, 2021 at 5:00 PM Central Time. Entries received after this time will not be accepted.

Note: Interested Applicants may not apply in more than one competitor categories: U.S., Canadian or Other International applicants. If interested Applicants applied to the NASA-managed challenge, they will automatically be deemed ineligible Applicants for the Canadian Challenge.

This form is for Canadian Applicants only. Interested U.S. and Other International applicants may refer to the [deepspacefoodchallenge.org](https://deepspacefoodchallenge.org) website for more information on how to register and apply to the challenge.

## Section 1 – Applicant Details

### 1. Concept Design Title

This title may be displayed on the challenge website post-submission.

### 2. Initial Concept Description

Provide a brief summary description of the proposed solution using non-technical language for public release in case your application is selected to move as semi-finalist.

### 3. Applicant

Enter the information of the organization which is leading the solution and which will receive prize funding if the solution is successful in the challenge.

#### 3.1 Legal Name of Organization/Group

#### 3.2 If your organization uses a different operating name, please include it here

#### 3.3 Address (Street, City, Province/Territory, Postal Code) and Mailing Address (if different than address)

#### 3.4 Telephone (xxx-xxx-xxxx)

#### 3.5 Email

#### 3.6 [optional] Organization/Group website URL

### 4. Please confirm the category of Eligible Applicant that applies to you:

Individuals or groups of individuals are encouraged to submit an application to the challenge, but in order to be eligible to receive prizes, they will be required to establish a Canadian legal entity (such as a corporation or a not-for-profit organization) capable of entering into binding agreements in Canada.

- Businesses or other for-profit organizations in Canada;
- Not-for-profit organizations in Canada;
- Indigenous organizations and groups located in Canada;

Post-secondary/academic institutions located in Canada;

Individuals or groups of individuals based in Canada;

5. Business Identification Number, Charity or Not-for-Profit Organization Number (if available)

Visit this link for more information

6. If you are an individual or group of individuals based in Canada, please confirm that you are willing to establish a Canadian legal entity (such as a corporation or a not-for-profit organization) capable of entering into binding agreements in Canada.

\*If you answer no to this question, you will not be eligible to receive a prize.

Yes

No

Already established as a Canadian legal entity

7.1 Primary Contact of Applicant and for the Team

7.1.1 Full Name

7.1.2 Job Title

7.1.3 Organization

7.1.4 Province or Territory

Alberta

British Columbia

Manitoba

- New Brunswick
- Newfoundland and Labrador
- Northwest Territories
- Nova Scotia
- Nunavut
- Ontario
- Prince Edward Island
- Quebec
- Saskatchewan
- Yukon

7.1.5 Email

7.1.6 Telephone Number (xxx-xxx-xxxx)

7.1.7 Preferred Language of Communication

- English
- French

7.2 [Optional] Submit information for additional Team members, if applicable.

	Full Name	Job Title	Organization	Province or Territory
+				

8. If you are collaborating with other organizations to develop your solution, list them below and briefly indicate their role in the solution development process, if applicable

	Organization	Role
+		

[Optional] Additional information: Are you looking for additional talent or complementary expertise to design and implement your idea? If you haven't already registered your interest for the challenge, please do so here to access invitations to participate in learning and/or networking events leading up to the close of the application period.

## Section 2 – Proposed Solution Details

### 1. Design Abstract

This is your elevator pitch to describe your food production technology to the Judging Panel members. This is your opportunity to make a strong first impression, so make every word count!

Provide a brief summary description of the food production technology to address the following questions:

- What is your proposed technology?
- What is novel, sustainable, and innovative about your proposed technology?
- What types of food does your technology produce?
- How are you minimizing inputs and maximizing food outputs?

(maximum 1,500 characters)

### 2. Design Report

#### 2.1 Description of the food production technology

Describe what the technology is, what it does, how it functions, and how the crew will interact with it. Include descriptions of major hardware components and processes.

(maximum 3,000 characters)

Describe the basic operations concept of the food production technology. Describe assumptions required of operation. For example, is a sterile/aseptic environment needed? Are special steps required between production cycles? Must fluids or materials be removed or added to prime/inoculate a system?

(maximum 1,500 characters)

## 2.2 INNOVATION

Describe what makes the food production technology novel, innovative and sustainable

(maximum 3,000 characters)

## 2.3 ADHERENCE TO CONSTRAINTS

In Phase 1, Adherence to Constraints is not meant to determine whether the Design Report itself is complete in including all the required information. This question is meant to ensure that Teams have considered the constraints, and that the food production technology design, at a minimum, falls within those constraints. In future Phases, Teams' food production technologies will be evaluated and scored on whether or not the design stays within the constraints so that it ultimately can meet CSA's needs and deliver value.

Describe and/or confirm how the food production technology design adheres to the constraints listed below:

**VOLUME:** Food production technology must:

- Be  $\leq 2$  cubic meters
- Pass through a doorway that is 1.07 m wide and 1.90 m tall
- Fit in a room that is: 1.829 m X 2.438 m X 2.591 m (W x D x H)

(maximum 300 characters)

**POWER:**

- Maximum draw of 3,000 Watts
- Average draw of  $<1,500$  Watts

(maximum 300 characters)

**WATER:** Net consumption of water is not constrained, but greater net water consumption may result in a lower score on the Resource Inputs & Outputs performance requirement described later in the application. (see Applicant Guide for reference)

- Net consumption of water is measured by the following equation:
  - $C_{Net} = (\text{Initial water input} + \text{“new water” added over time})$
- In this calculation:
  - Do not include water recycled by your system in the “new water”
  - Do not subtract the water remaining in your system after the food has been collected
  - Do not subtract water lost to the vehicle environment (e.g., water evaporated into the vehicle’s air)

(maximum 300 characters)

**MASS:** Not constrained, but greater mass may result in a lower score on the Resource Inputs & Outputs performance requirement (see Applicant Guide for reference).

(maximum 300 characters)

**DATA CONNECTION:** In Phase 1, the food production technology may be designed to transmit operational data and limited video to a remote location outside of the technology itself, and receive periodic operational commands. Future phases of this Challenge will require greater autonomy.

(maximum 300 characters)

**CREW TIME:** Maintenance & Operations of the system: Not constrained, although Teams should target a maximum crew time of 4 hours per week for operations of the food production technology for the entire crew of 4 individuals.

(maximum 300 characters)

**OPERATIONAL CONSTRAINTS:** Earth gravity (9.81 m/s<sup>2</sup>) and ambient atmospheric conditions of 101,325 Pascals, 22 degrees Celsius and 50 percent relative humidity.  
(maximum 300 characters)

2.4 Describe how the food production technology addresses the following performance criteria (see Applicant Guide for reference).

#### 2.4.1 ACCEPTABILITY

##### ACCEPTABILITY – Process

Operations processes and procedures, including how a person will set up and use the solution  
Operational footprint (i.e., how much space is needed for the solution and its related processes?)  
Food production technology set up  
Food production cycle, including steps to produce food products  
Food handling, processing procedures and collection of food products  
Shutdown, cleaning, and/or stowage procedure(s)  
An estimate of the overall crew time to operate and maintain the technology  
Provide an assessment (using industry standards and/or existing research) that your technology processes are likely to be user friendly and acceptable to crew.

(maximum 3,000 characters)

##### ACCEPTABILITY – Food products

Provide an assessment (using industry standards and existing research) that the food outputs of your technology are likely to meet the acceptability target. This assessment should include appearance, aroma, palatability, flavor, and texture. Rate and describe the potential acceptability of your food products on a 9 point hedonic scale (see Applicant Guide for reference).

(maximum 3,000 characters)

Additional comments on Acceptability / Palatability

(maximum 1,000 characters)

#### 2.4.2 SAFETY

SAFETY – Process

Describe the safety of the food production process, including any potential operational risks for the technology; indicate how they may be mitigated on a three-year mission. Describe relevant food safety procedures.

(maximum 3,000 characters)

SAFETY – Food products Describe the safety of the resulting food products, including safety for repeated human consumption.

(maximum 3,000 characters)

Additional Comments on Safety

(maximum 1,000 characters)

### 2.4.3 RESOURCE INPUTS & OUTPUTS

Describe the resource requirements of the food production process (inputs) and all outputs. Estimated quantities of each input and output should be provided:

INPUTS to the technology:

- Physicochemical/material inputs
- Water Energy
- Other inputs

(maximum 3,000 characters)

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OUTPUTS from the technology:

- Food products
- Waste Heat (Latent and Sensible)
- Other outputs or benefits

(maximum 3,000 characters)

Describe how the food production technology achieves the greatest amount of food output in relation to the quantity of inputs and quantity of waste output.

(maximum 1,500 characters)

Describe the nutritional quality of the resulting food products: Macronutrients Micronutrients Variety of Nutrients

(maximum 3,000 characters)

Additional Comments on Safety

(maximum 1,000 characters)

#### 2.4.4 RELIABILITY / STABILITY

RELIABILITY – Process Describe how the food production technology can reliably perform its intended function. You may include:

- Operational lifespan (i.e., how long is the solution designed to last?)
- Whether there is less than 10% loss of functionality or food production
  - Maintenance processes and procedures
  - Maintenance schedule (i.e., how often will it need maintenance?)  
Component/element maintenance or replacement (i.e., what components will need to be replaced, and when?)
  - Critical spare parts for a three-year mission

(maximum 3,000 characters)

#### STABILITY

Describe the stability of both the input products used and food product outputs. Description should include the estimated time the inputs and outputs will be fit for use and/or consumption (i.e., shelf-life).

(maximum 1,500 characters)

Additional Comments on Safety

(maximum 1,000 characters)

#### 2.5 TERRESTRIAL POTENTIAL

Describe how the food production technology may have the potential to improve terrestrial food production (maximum 3,000 characters)

## 2.6 Supporting material

2.6.1 Include any visual representations of the food production technology, which may include models, schematics, or drawings. (Maximum five (5) 8.5" x 11" pages; PDF; 16MB limit)

2.6.2 (Optional) Include any preliminary data or calculations that support the design and operation of the food production technology. (Maximum two (2) 8.5" x 11" pages; PDF; 16MB limit)

## 3. Design Animations

Submit a design animation (5-minute maximum length) showing the food production technology under operation (simulation) and include the following elements:

- Setup
- Operations from a user perspective
- Inputs and outputs
- Shutdown and cleaning

(Provide a link to the video)

## 4. Intellectual Property

- Who owns the intellectual property of the proposed solution? Explain, taking into account the context of your organization.
- Is the solution built on existing or off-the-shelf technology protected by intellectual property (e.g. patents, copyrights, trade secret, etc.)? If so, detail the permissions (if applicable) you have to use that technology.

(maximum 1,200 characters)

## Certification

I certify that the Applicant and my Team members have all the rights/permissions for using the intellectual property for the proposed food production technology, as part of this challenge.

## Section 3 – Declaration

As Primary Contact for my Team, I confirm that I represent the Applicant and my Team when completing the following section, and that the Duly Authorized Representative of my organization is supportive of our submission (if applicable; see Applicant Guide for reference)

- Yes
- No

As Primary Contact and on behalf of the Applicant and my Team, I confirm that I have read and accepted the terms and conditions contained in the Applicant Guide (see Applicant Guide for reference).

- Yes
- No

I acknowledge that by submitting this challenge application form I agree to the following:

- Yes
- No

### **Use and/or Disclosure**

The personal and/or business information in, accompanying and/or submitted in support of this application is being collected under the authority of the Canadian Space Agency Act and, by applying to the Challenge, Applicants agree that such information, may be used by CSA, or disclosed to third parties including other Government Departments, members of the Jury Panel and National Aeronautics and Space Administration (NASA) and their respective authorized representatives, to:

- assess and review the eligibility of the Applicant and the Solution under the applicable CSA program;
- verify the accuracy of the information provided in or with the application form and additional documents;
- assess the efficiency of the challenge model in furthering departmental priorities; and
- assess how well the initiative contributed to CSA program objectives.

The Applicant consents that the information may also be used for the purposes of: contacting you should additional information be required; validating your credentials; signing a grant agreement; facilitating payment of the grant in the event your application is successful; program administration; and evaluation, reporting, and statistical analysis.

The information collected under the application form of the Impact Canada Deep Space Food Challenge will be stored and protected in the personal information bank of CSA (ASC PPU 045). Personal information will be treated and disclosed in accordance with the Privacy Act. You have the right to access your personal information held by the Canadian Space Agency and to request changes to correct personal information by contacting CSA Access to Information and Privacy Director at [asc.aiprp-atip.csa@canada.ca](mailto:asc.aiprp-atip.csa@canada.ca).

Business information will be disclosed only in accordance with the provisions of the Access to Information Act.

Information on the Privacy Act and the Access to Information Act is available at the following website: <http://laws.justice.gc.ca>. For further information about these Acts please contact the Access to Information and Privacy Director at [asc.aiprp-atip.csa@canada.ca](mailto:asc.aiprp-atip.csa@canada.ca).

#### Copyright permission

CSA may disclose, reproduce and distribute any part of or the whole of the documentation provided in or with this Application Form, within CSA and to its authorized third parties, including other Government Departments and the National Aeronautics and Space Administration (NASA), for purposes consistent with the receipt, assessment and subsequent treatment of the Application.

### Section 4 – Survey [Optional]

Thank you for taking the time to complete this short survey about your recent experience as an applicant to an Impact Canada Challenge.

The purpose of this survey is to gather your insights as an applicant to help us review and improve the design of future challenges so that they can more effectively stimulate innovation.

This survey is confidential. The data collected in this survey will be aggregated to help us understand what works in a challenge, and what to improve in future challenge design. No individual answers will be published. Your answers to this survey will not be used in the assessment process and will not affect your chances of success in this challenge or any other federal funding application.

#### 1. How did you first hear about the challenge?

News

- Social media
- Government or other funding program
- Networks related to the subject matter of the challenge (e.g. opioids, housing, clean technology)
- Networks related to innovation or entrepreneurship
- Impact Canada website
- Political official
- Government official
- Other method

Specify

2. Which of the following incentives motivated you to participate in the challenge?

Select all that apply

- The chance to work on a tough problem or something I care about
- The chance to test out a new idea
- Financial support (staged funding)
- The prize money itself
- Mentoring and skill development
- Access to facilities or equipment (labs, testing facilities, industrial assistance, etc...)
- Media exposure
- Organizational capacity building
- Opportunity to build collaborative partnerships
- Other incentive

Specify

3. In the past five years, have you applied for a Government of Canada grant or contribution program (other than this challenge)?

- Yes
- No

3.1 Relative to your experience with other Government of Canada funding applications, how easy or difficult did you find the challenge application?

- A lot easier
- Somewhat easier
- About the same
- Somewhat more difficult
- A lot more difficult
- Not applicable

3.2 Approximately how many grants or contributions have you received from the Government of Canada over the past five years?

- None
- 1 or 2
- 3 to 5
- More than 5

3.3 Other than any money you may have received as part of this challenge, approximately what was the total aggregate value of the grants and contributions you have received from the Government of Canada over the past five years?

- less than \$10,000
- between \$10,001 and \$50,000
- between \$50,001 and \$150,000
- between \$150,001 and \$300,000

- between \$300,001 and \$500,000
- between \$500,001 and \$1,000,000
- over \$1,000,001
- don't know

The following question will help us to better interpret your responses. Rest assured that any data collected will strictly be used to help us understand whether and how challenges are an effective tool, and to help us improve upon their design in the future. No information that could potentially identify you or your responses to this survey will be released.

4. Please confirm your business number/charitable registration number

Reference Only