User Input	Calculated or from other tab	Instructions are in yellow boxe

This worksheet is used to capture information on Clean Energy Manufacturing and Recycling projec
Applicant should first fill out the relevant user input (green) cells in the *Project Overview* tab. Next,
tabs, as well as the yellow tab that is specific to your Technology Area. Data will be extracted from t

Section	Applicant Information	Input
Project Overview	Applicant Case Number	
	Company Name	
	City (HQ)	
	State (HQ)	
	Zip Code (HQ)	
	City (Facility)	
	State (Facility)	
	Zip Code (Facility)	
	Qualified Investment ($)	
	Expected Credit Rate	30%
	Tax Credit ($)	0
	Production or Recycling	
	Primary Technology Area	
	Primary Production Output	

es next to the corresponding inputs

t proposals. Input data and assumptions should be substantiated in and show clear correspondence to applicant'
applicant should fill out the user input cells in the *Supply Chain*, *Community Benefits and Jobs*, *Emissions*, and *Vo*
this workbook to compare submissions. Therefore, no cells, rows, or columns should be added.

Units	Notes
	The case number used to track the application in the DOE 48C application portal
	Dollar amount of the qualified investment that "re-equips, expands, or establishes" the
	Applicants should select a 30% tax credit if they anticipate meeting the wage and appre requirements under 48C(e)(5) and (6). Applicants who do not anticipate meeting those should select 6% from the dropdown.
	Calculated by multiplying Qualified Investment by Expected Credit Rate.
	Indicate whether the project is primarily in producing or recycling eligible advanced ene
	Every application must choose at least one technology area (and fill out the correspondi
	Brief description of the facility output product in 5 words or less (e.g., "wind turbine bla

s project narrative.
luntary Disclosure

facility, as defined
nticeship requirements
rgy property. If it is
ng yellow tab). If
des").

User Input	Calculated or from other tab	Instructions are in yellow boxes next to t

Please list the direct jobs that will be created during both construction and operations of the facility. For retrofits
calculating incremental operating jobs created by the project. Please be as specific as possible.
Direct jobs are those jobs represented by the number of people whose work is directly billed to the project.
Do not list Indirect Jobs, defined as employees included in the supply chain who are not directly billed to the pro
- Producers of equipment or services that are used on the project
- Accounting or administrative services
- End-use installers
- Operating jobs unrelated to the project (for a GHG reduction project in a steel facility, do not count steelworker
The review team will calculate indirect jobs using a consistent methodology.

Applicant should fill out this section for any construction jobs they anticipate will meet wage and apprenticeship
requirements under 48C(e) and corresponding Treasury guidance.

Construction Jobs - Meeting Wage and Apprenticeship Requirements

Job Category *Applicant can determine category*	Annualized FTE *FY2023*	Annualized FTE *FY2024*	Annualized FTE *FY2025*	Annualized FTE *FY2026*

the corresponding inputs

s/reequipped facilities, please list the number of current jobs for the purposes of

oject. Examples include:

rs not working on the GHG reduction)

Annualized FTE
FY2027

Applicant should fill out this section only if they anticipate that certain construction j
prevailing wage and apprenticeship requirements. If so, they are not guaranteed the
expect to receive a 6% credit or pay penalties.

Construction Jobs - NOT Meeting Wage and Apprenticeship Requirements

Job Category	Annualized FTE	Annualized FTE	Annualized FTE
Applicant can determine category	*FY2023*	*FY2024*	*FY2025*

obs will not meet
30% credit and should

Annualized FTE	Annualized FTE
FY2026	*FY2027*

Current and anticipated operating jobs at the facility. Applic
this is an existing facility.

Operating Jobs

Job Category	Current FTE (if applicable)	Annualized New FTE
Applicant can determin	*FY2022*	*FY2023*

cant should fill out the first column for Current FTE only if

Annualized New FTE *FY2024*	Annualized New FTE *FY2025*	Annualized New FTE *FY2026*	Annualized New FTE *FY2027*

User Input

This worksheet is used to
first fill out the relevant u
Technology Area. Data w

Section
Project to completion
Site selection
Funding availability
Market overview
Corporate health

Calculated or from other tab

capture information on commercial viability of Clean Energy Manufacturing and Recycling pro
user input (green) cells in the *Project Overview* tab. Next, applicant should fill out the user inpu
ill be extracted from this workbook to compare submissions. Therefore, no cells, rows, or colu

Applicant Information
Date Complete Permitting
Date Begin Construction
Date Begin Operation
Company Name
City (Facility)
State (Facility)
Zip Code (Facility)
Equity (%)
Debt (%)
Equity sources
Debt sources
State or local incentives ($)
Other federal incentives ($)
Market share
Expected growth in the next 5 years after production commencement
End use application or installation of product
Ongoing legal claims (Yes or No)
Planned debt restructuring (Yes or No)
Other planned corporate actions that may affect completion of project (Yes or No)

oject proposals. Input data an
ut cells in the *Supply Chain*, *Co*
mns should be added.

Input

Instructions are in yellow boxes next to the corresponding inputs

d assumptions should be substantiated in and show clear correspondence to applicant's project narrative. Applicant should
mmunity Benefits and Jobs, *Emissions*, and *Voluntary Disclosure* tabs, as well as the yellow tab that is specific to your

Notes
Automatically populated from "Project Overview" tab.
Automatically populated from "Project Overview" tab.
Automatically populated from "Project Overview" tab.
Indicate the percentage equity held by the company in the project.
Indicate the percentage of debt owed by the company. Enter 0 if not applicable.
Indicate amount of state or local incentives received for the project.
Indicate amount of other federal incentives received for the project.
Indicate the percentage of expected growth rate for the product after 5 years of project commencement.
Indicate if there are any ongoing or expected legal claims related to the project . If selecting Yes, explain in brief.
Indicate any planned debt restructuring. If selecting Yes, explain in brief.
Indicate any planned corporate or management actions that can impact the timely completion of the project or can cause the project to be stalled for an extended period of time. If selecting Yes, explain in brief.

Instructions for Manufacturers of Eligible Renewable Energy Products or Microturbines

User Input	Calculated or from other tab	Instructions are in yellow boxes next to the

Applicants should complete **ONLY ONE TAB per application** on the basis of their technology area.

Annual Attributable Production Capacity (AAPC)

Descriptor	**Data**	**Units**	**Notes/Instructions**
Annual Production Capacity		*MW/year*	Expected annual production. Us electrical technologies such as s components without watt rating the amount of watts of the end component, and state your assu
Conversion Factor and Explanation			For non-watt rated technologies factor (e.g., square meters to wa
Manufacturing Contribution		*$/W*	Value added contribution to syst feedstock materials, upstream c
Total System Hardware Price		*$/W*	Price to end user of total system system but excluding installation
Typical Annual Capacity Factor		*%*	See *Assumptions* tab for commo assumptions of typical use. Defi output)/(peak power rating * 87 capacity factor, please justify in
Share of facility output		*%*	Fraction of production from proj that will be allocated for renewa

corresponding inputs

e equivalent watts for non- olar water heating. For ;s, make an assumption about product per unit of your mptions below.	
ONLY, explain your conversion atts) in 50 words or less.	
tem (excludes price paid for omponents, etc.).	
hardware including balance of labor costs.	
n capacity factors, based on ned as (annual energy '60 hours). If you use a different the narrative.	
ject (i.e., manufacturing facility) ble resource production.	

EXAMPLE

Descriptor	**Data**
Annual Production Capacity	50
Conversion Factor and Explanation	N/A
Manufacturing Contribution	0.06
Total System Hardware Price	0.64
Typical Annual Capacity Factor	25%
Share of facility output	100%

Units	Notes/Instructions
MW/year	Facility produces 50 MW of c-Si solar PV cells per year for small-scale residential developers.
	Not applicable; technology is already rated in watts.
$/W	Cost to produce a c-Si solar PV cell is $0.18/W, including margin, but cost of inputs is about $0.12/W. So value add is $0.06/W.
$/W	Total hardware cost of solar module and BOS (NREL, 2022).
%	Average U.S. capacity factor of solar PV is 25%, per the *Assumptions* tab.
%	All of the facility's production goes to solar cell manufacturing.

Instructions for Manufacturers of Eligible Renewable Energy Products or Microturbines

User Input	Calculated or from other tab	Instructions are in yellow boxes next to the

Applicants should complete **ONLY ONE TAB per application** on the basis of their technology area.

Annual Attributable Production Capacity (AAPC)

Descriptor	Data	Units	Notes/Instructions
Annual Production Capacity		*MW/year*	Expected annual production. Us electrical technologies such as s components without watt rating the amount of watts of the end component, and state your assu
Conversion Factor and Explanation			For non-watt rated technologies factor (e.g., square meters to wa
Manufacturing Contribution		*$/W*	Value added contribution to syst feedstock materials, upstream c
Total System Hardware Price		*$/W*	Price to end user of total system system but excluding installatior
Typical Annual Capacity Factor		*%*	See *Assumptions* tab for commo assumptions of typical use. Defir output)/(peak power rating * 87 capacity factor, please justify in
Share of facility output		*%*	Fraction of production from proj that will be allocated for renewa

corresponding inputs

e equivalent watts for non-
olar water heating. For
;s, make an assumption about
product per unit of your
mptions below.

ONLY, explain your conversion
atts) in 50 words or less.

tem (excludes price paid for
omponents, etc.).

hardware including balance of
labor costs.

n capacity factors, based on
ned as (annual energy
'60 hours). If you use a different
the narrative.

ject (i.e., manufacturing facility)
able resource production.

EXAMPLE

Descriptor	Data
Annual Production Capacity	50
Conversion Factor and Explanation	N/A
Manufacturing Contribution	0.06
Total System Hardware Price	0.64
Typical Annual Capacity Factor	25%
Share of facility output	100%

Units	Notes/Instructions
MW/year	Facility produces 50 MW of c-Si solar PV cells per year for small-scale residential developers.
	Not applicable; technology is already rated in watts.
$/W	Cost to produce a c-Si solar PV cell is $0.18/W, including margin, but cost of inputs is about $0.12/W. So value add is $0.06/W.
$/W	Total hardware cost of solar module and BOS (NREL, 2022).
%	Average U.S. capacity factor of solar PV is 25%, per the *Assumptions* tab.
%	All of the facility's production goes to solar cell manufacturing.

Instructions for Manufacturers of Eligible Refining, Blending, or Electrolyzing Equipment or Fuel Ce

User Input	Calculated or from other tab	Instructions are in yellow boxe	
Applicants should complete **ONLY ONE TAB per application** on the basis of their technology area.			
Fuel Type/Process			Select the electrolyzi

Annual Attributable Production Capacity (AAPC)

Descriptor	Data	Units	Notes/Inst
Annual Production Capacity		*Unit/year*	Projected (manufactu
Manufacturing Contribution		*$/Unit*	Value adde feedstock
Total Installed System Price		*$/Unit*	Price to en system but
Capacity per unit per year		*GGE*	Amount of refining, el expressed MW, or otl MJs.
Deployed Property Lifetime	Err:509	*years*	Number of
Share of Facility Output	13	*%*	Fraction of allocated t **Please typ convert to**

lls

es next to the corresponding inputs

most representative fuel refining, blending, or ng process.	Fuel Type/Process

	EXAMPLE
ructions	**Descriptor**
(not peak or potential) number of units ired annually.	Annual Production Capacity
ed contribution to system (excludes price paid for materials, upstream components, etc.).	Manufacturing Contribution
d user of total system hardware including balance of t excluding installation labor costs.	Total Installed System Price
fuel, chemical, or product enabled the given unit of ectrolyzing, or blending equipment annually, best in gallons of gasoline equivalent (GGE). Kilograms, her units should be converted to GGE using BTUs or	Capacity per unit per year
years the deployed equipment will operate.	Deployed Property Lifetime
project (i.e., manufacturing facility) that will be o eligible equipment. **e in a percentage (no greater than 100) -- we will not a percentage.**	Share of Facility Output

Alcohol to jet from isobutanol - fermentation - corn grain/starch		The electrolyzers will run on renewable electricity, so the applicant selects the LCA for "renewable electrolysis." This is equivalent to a 100% reduction in emissions per GGE.

Data	Units	Notes/Instructions
50	*Unit/year*	Applicant produces 1000 1-MW electrolyzers at its new facility.
50,000	*$/Unit*	Electrolyzers are sold for $100,000 each, but use $50,000 worth of platinum group metals and other inputs, so the value added by the manufacturer is $50,000.
1,000,000	*$/Unit*	The full hydrogen electrolysis system is estimated at $1 million for a 1-MW capacity electrolyzer.
150,000	*GGE*	A 1-MW electrolyzer could be expected to produce about 150,000 kg of hydrogen per year under typical operating conditions.
10	*years*	Electrolyzers are expected to last about 10 years before replacement.
100	*%*	100% of the facility will be used to produce clean hydrogen.

Instructions for Manufacturers of Energy Storage Systems

User Input	Calculated or from other tab	Instructions are in yellow boxes next

Applicants should complete **ONLY ONE TAB per application** on the basis of their technology area.

Annual Attributable Production Capacity (AAPC)

Descriptor	Data	Units	Notes/Instructions
Annual Production Capacity		*MW/year*	Expected annual produ production capacity in output of the batteries watt ratings, make an a the end product per ur assumptions below.
Conversion Factor and Explanation			For non-watt rated tec factor (e.g., square me
Manufacturing Contribution		*$/kWh*	Value added contributi feedstock materials, up
Total System Hardware Price		*$/kWh*	Price to end user of tot system but excluding in
Typical Annual Capacity Factor		*%*	See *Assumptions* tab fo assumptions of typical output)/(peak power r capacity factor, please
Share of facility output		*%*	Fraction of production that will be allocated fo

to the corresponding inputs

	EXAMPLE
	Descriptor
uction. Facilities that typically express their Megawatt-Hours should instead state power ; in Megawatts. For components without assumption about the amount of watts of nit of your component, and state your	Annual Production Capacity
hnologies ONLY, explain your conversion ters to megawatt-hours) in 50 words or less.	Conversion Factor and Explanation
ion to system (excludes price paid for ostream components, etc.).	Manufacturing Contribution
tal system hardware including balance of nstallation labor costs.	Total System Hardware Price
or common capacity factors, based on use. Defined as (annual energy ating * 8760 hours). If you use a different justify in the narrative.	Typical Annual Capacity Factor
from project (i.e., manufacturing facility) or renewable resource production.	Share of facility output

Data	Units	Notes/Instructions
100	*MW/year*	Lithium-ion battery factory assembles 200 MWh of 2-hour duration batteries for stationary storage applications. Those batteries represent 100 MW of power.
N/A		N/A
$50	*$/kWh*	Manufacturer adds $50/kWh of value in assembling the battery cell and pack.
$400	*$/kWh*	Total price of the installed system is $400/kWh.
10%	*%*	Capacity factor of stationary storage, according to the *Assumptions* tab.
100%	*%*	100% of the factory is being used for battery production.

Instructions for Manufacturers of Eligible Electric, Fuel Cell, and Hybrid Vehicles and Components (

User Input	Calculated or from other tab	Instructions are in yellow boxe

Applicants should complete **ONLY ONE TAB per application** on the basis of their technology area.

Annual Attributable Production Capacity (AAPC)

Descriptor	Data	Units	Notes/Inst
Annual Production Capacity		*Unit/year*	Projected (manufactu
Manufacturing Contribution		*$/Unit*	Value adde feedstock
Total Price of Vehicle Equipment		*$/Unit*	Price to en system but
Deployed Property Lifetime	Err:509	*years*	Number of
Share of facility output		*%*	Fraction of that will be **Please typ**

The following formulas calculate the greenhouse gas emissions reductions associated with the project.

Indirect Greenhouse Gas Reductions and Simplified Cost of Abatement

Descriptor	Data	Units	Notes/Inst
Average Annual Mileage		*Miles/year*	List the ave for both th *Assumptio*
Annual Baseline System Fuel Consumption		*MPGGE*	Projected l equivalent (e.g., avera
Annual Improved System Fuel Consumption		*MPGGE*	Projected l typical ope duty vehicl **below. If p**

Miles per kWh		*Miles per kWh*	If electric c typical ope

excl. charging equipment)

es next to the corresponding inputs

:ructions	EXAMPLE Descriptor
(not peak or potential) number of units ıred annually.	Annual Production Capacity
ed contribution to system (excludes price paid for materials, upstream components, etc.).	Manufacturing Contribution
d user of total system hardware including balance of t excluding installation labor costs.	Total Price of Vehicle Equipment
years the deployed equipment will operate.	Deployed Property Lifetime
production from project (i.e., manufacturing facility) allocated to produce vehicle technology. **e in a percentage (no greater than 1) -- we will not**	Share of facility output

:ructions	EXAMPLE Descriptor
erage annual operations of the class of vehicle, used ie baseline and the improved system. Use the *ns* tab as needed.	Annual Mile
liquid fuel consumption in gallons of gasoline (GGE) of baseline system under typical operation ıge fuel economy of a heavy-duty vehicle).	Annual Baseline System Fuel Consumption
liquid fuel consumption of improved system under ration (e.g., average fuel economy of a hybrid heavy-le). **If fully electric, enter "0" and fill out the row lugin hybrid, fill out both rows.**	Annual Improved System Fuel Consumption

or plug-in hybrid, state the required electricity under eration (e.g., average MPGe of an electric vehicle).	Miles per kWh

Data	Units	Notes/Instructions
100,000	*Unit/year*	Applicant produces 100,000 EV batteries per year at its 10 GWh factory.
$6,000	*$/Unit*	Finished battery is sold for $12,000, but inputs and subcomponents cost $6,000, so the "manufacturing contribution" of this facility is $6,000.
$25,000	*$/Unit*	Total price of electric vehicle is $25,000.
20	*years*	Assumed EV lifetime is 20 years.
90%	*%*	90% of the facility's output goes to EVs, 10% to consumer electronics.

Data	Units	Notes/Instructions
10,850	*Miles*	Per *Assumptions* tab, presumes the vehicle class has a annual mileage of 10,850 miles.
23	*GGE/year*	Per *Assumptions* tab, presumes the baseline system gets 23.4 miles per gallon.
0	*GGE/year*	Presumes the improved system uses no liquid fuel.

3	The improved system uses electricity and gets roughly 3 miles per kWh.

Instructions for Manufacturers of Eligible Grid Modernization Equipment and Electric Vehicle Charg

User Input	Calculated or from other tab	Instructions are in yellow boxe

Applicants should complete **ONLY ONE TAB per application** on the basis of their technology area.

Annual Attributable Production Capacity (AAPC)

Descriptor	Data	Units	Notes/Instr
Annual Production Capacity		*Units, kVA, etc. per year*	Projected (r manufactur terms of pc raw numbe
Manufacturing Contribution		*$/Unit*	Value adde feedstock r
Total Price of Equipment		*$/Unit*	Price to enc system but
Typical Annual Capacity Factor		*%*	See *Assum* assumptior output)/(pe capacity fac
Share of facility output		*%*	Fraction of that will be **Please type**

ting Equipment	
s next to the corresponding inputs	

	EXAMPLE
ructions	**Descriptor**
not peak or potential) number or capacity of units red annually. If possible, express the total capacity in ower capacity (e.g., kVA for transformers) rather than r of units.	Annual Production Capacity
d contribution to system (excludes price paid for naterials, upstream components, etc.).	Manufacturing Contribution
d user of total system hardware including balance of excluding installation labor costs.	Total Price of Equipment
ptions tab for common capacity factors, based on ns of typical use. Defined as (annual energy eak power rating * 8760 hours). If you use a different ctor, please justify in the narrative.	Typical Annual Capacity Factor
production from project (i.e., manufacturing facility) allocated to produce vehicle technology. **e in a percentage (no greater than 1) -- we will not**	Share of facility output

Data	Units	Notes/Instructions
2,000	*MVA/year*	Projected (not peak or potential) number or capacity of units manufactured annually. If possible, express the total capacity in electrical terms (e.g., kVA for transformers) rather than raw number of units.
1,000,000	*$/Unit*	The manufacturer purchases $500,000 of raw materials for each LPT, but sells each one for $1.5 million, so generates $1 million of value in the process.
1,500,000	*$/Unit*	The total value of the completed LPT is $1.5 million
65%	*%*	Average U.S. capacity factor of transmission equipment is 65%, per the *Assumptions* tab.
100%	*%*	We assume all of the facility output is for LPTs.

Product and Process
Gasoline
Alcohol to jet from ethanol - gasification - wood waste
Alcohol to jet from ethanol - gasification - municipal solid waste
Alcohol to jet from ethanol - fermentation - corn grain/starch
Alcohol to jet from ethanol - fermentation - corn stover
Alcohol to jet from ethanol - fermentation - industrial off-gases
Alcohol to jet from isobutanol - fermentation - corn grain/starch
Alcohol to jet from isobutanol - fermentation - corn stover
Alcohol to jet from isobutanol - fermentation - forest residue
Alcohol to jet from isobutanol - fermentation - miscanthus, switchgrass
Hydroprocessed ethers and fatty acids (HEFA) - tallow/animal fat
Hydroprocessed ethers and fatty acids (HEFA) - used cooking oil
Hydroprocessed ethers and fatty acids (HEFA) - corn oil
Hydroprocessed ethers and fatty acids (HEFA) - soybean oil
Fischer-tropsch - forest residue
Fischer-tropsch - woody energy crops
Fischer-tropsch - miscanthus, switchgrass
Fischer-tropsch - municipal solid waste
Ex-situ catalytic fast pyrolysis (CFP) - woody biomass
Ethanol - fermentation - corn grain/starch
Ethanol - fermentation - corn stover
Ethanol - gasification w/ syngas fermentation - corn stover
Ethanol - gasification w/ syngas fermentation - forest residue
Ethanol - gasification w/ syngas fermentation - switchgrass
Ethanol - gasification w/ syngas fermentation - municipal solid waste
Ethanol - gasification w/ syngas fermentation - wood waste
Ethanol - gasification w/ syngas fermentation - industrial waste gas
Biodiesel/FAME - tallow/animal fat
Biodiesel/FAME - used cooking oil
Biodiesel/FAME - cellulosic feedstocks
Renewable natural gas/biomethane - landfill gas
Renewable natural gas/biomethane - manure
Renewable propane
Renewable naphtha/gasoline
Gaseous hydrogen - renewable electrolysis

Propane
Diesel and home heating fuel (distillate fuel oil)
Kerosene
Coal
Natural gas

Grid electricity

Renewable electricity from wind energy
Renewable electricity from solar energy
Renewable electricity from nuclear energy
Renewable electricity from hydropower energy
Renewable electricity from geothermal energy
Renewable electricity from biomass energy
Renewable electricity from marine energy
Other

Technology Areas
Renewable resources - 48C(c)(1)(A)(i)(I)
Fuel cells, microturbines, or energy storage - 48C(c)(1)(A)(i)(II)
Electric grid modernization - 48C(c)(1)(A)(i)(III)
Property to capture, use, sequester CO2 - 48C(c)(1)(A)(i)(IV)
Refining, electrolyzing, or blending equipment - 48C(c)(1)(A)(i)(V)
Energy conservation - 48C(c)(1)(A)(i)(VI)
Electric or fuel cell vehicles - 48C(c)(1)(A)(i)(VII)
Hybrid vehicles not less than 14,000 lbs - 48C(c)(1)(A)(i)(VIII)
Other - 48C(c)(1)(A)(i)(IX)

Renewable, Low-Carbon, or Low-Emissions Fuel, Chemical or Product
Energy Fuels

Instructions for Manufacturers of Eligible Energy Conservation Equipment

User Input	Calculated or from other tab	Instructions are in yellow boxe

Manufacturing facilities for eligible energy conservation equipment should complete each green cell on this ta

Fuel Information

Baseline Fuel Type/Process		**If selected 'Other', explain here**	Select the or electroly
Improved Fuel Type/Process		**If selected 'Other', explain here**	Select the blending, c projects, se fuel switch

Annual Attributable Production Capacity (AAPC)

Descriptor	**Data**	**Units**	**Notes/Inst**
Annual Production Capacity		*Unit/year*	Projected (manufactu
Manufacturing Contribution		*$/Unit*	Value adde feedstock r
Total Price of Efficiency Equipment		*$/Unit*	Price to en system but
Annual Baseline System Consumption		*MMBTU/year*	Likely annu (WITHOUT operation c natural gas the assum
Annual Improved System Consumption		*MMBTU/year*	Likely annu fuel switch (e.g., energ
Deployed Property Lifetime		*years*	See *Assum* assumption equipment
Share of Facility Output		*%*	Fraction of

es next to the corresponding inputs ab to indicate annual production. These metrics

		EXAMPLE
most representative baseline fuel refining, blending, yzing process.		Baseline Fuel Type/Process
most representative improved/ new fuel refining, or electrolyzing process. For efficiency improvement elect the same fuel type/ process as the baseline if ing not applicable and explain efficiency		Improved Fuel Type/Process

		EXAMPLE
ructions		**Descriptor**
(not peak or potential) number of units red annually.		Annual Production Capacity
ed contribution to system (excludes price paid for materials, upstream components, etc.).		Manufacturing Contribution
d user of total system hardware including balance of t excluding installation labor costs.		Total Price of Efficiency Equipment
ual energy consumption of baseline system fuel switching or efficiency technology) under typical (e.g., energy consumption of average home using s heating). Baseline system assumptions must match ptions used in commercial viability section of concept		Annual Baseline System Consumption
ual energy consumption of improved system (AFTER ing or efficiency technology) under typical operation gy consumption of average home with air source heat		Annual Improved System Consumption
ptions tab for common capacity factors, based on ns of typical use. Number of years the deployed t will operate.		Deployed Property Lifetime
production from project (i.e., manufacturing facility)		Share of Facility Output

Natural Gas	The project manufactures heat pumps which are assumed to replace natural gas furnaces.
Grid electricity	Heat pumps are assumed to be powered by grid electricity.

Data	Units	Notes/Instructions
10,000	*Unit/year*	Manufacturer produces 10,000 units of cold-climate air-source heat pumps
$3,500	*$/Unit*	Heat Pumps are sold for $5000 but incorporate $1500 of input materials and components, so the manufacturer's contribution is $3500 per unit.
$5,000	*$/Unit*	Price to end user of total HVAC system hardware including balance of system but excluding installation labor costs.
80	*MMBTU/year*	Annual energy consumption of the average building using natural gas furnance of comparable size to heat pump
16	*MMBTU/year*	Cold climate heat pump is projected to reduce energy usage by 64 MMBTU
10	*years*	Heat pumps average lifetime are 10 years
100%	*%*	All of the factory's output goes to producing heat pump

Instructions for Manufacturers of Carbon Capture, Removal, Use, and Storage or Other Greenhouse

User Input	Calculated or from other tab	Instructions are in yellow boxe	
Applicants should complete **ONLY ONE TAB per application** on the basis of their technology area.			

Annual Attributable Production Capacity (AAPC)

Descriptor	**Data**	**Units**	**Notes/Instr**
Annual Production Capacity		*Unit/year*	Projected (r annually.
Manufacturing Contribution		*$/Unit*	Value adde feedstock r
Total Cost of Emissions Reduction Component		*$/Unit*	Price to enc including ba
CO2e Reduction Per Unit		*Metric tons CO2e*	Annual CO2 equipment "CO2 Equiv
Deployed Property Lifetime	Err:509	*years*	Number of
Share of Facility Output		*%*	Fraction of that will be

e Gas Reduction Equipment
s next to the corresponding inputs

ructions
not peak or potential) number of units manufactured
d contribution to system (excludes price paid for naterials, upstream components, etc.).
d user of total system hardware (e.g., full CCS system) alance of system but excluding installation labor costs.
2-equivalent emissions reductions per unit deployed. For that reduces non-CO2 emissions, applicants can use the alency Assumptions" on the *Assumptions* tab.
years the deployed equipment will operate.
production from project (i.e., manufacturing facility) allocated to produce energy efficiency technology.

Annual Attributable Production Capacity
Descriptor
Annual Production Capacity
Manufacturing Contribution
Total Cost of Emissions Reduction Component
CO2e Reduction Per Unit
Deployed Property Lifetime
Share of Facility Output

(AAPC)

Data	Units	Notes/Instructions
100,000	*Unit/year*	A manufacturer projects that its new factory will produce 100,000 gallons of a solvent that can be used in carbon capture systems.
450	*$/Unit*	Value added contribution to system (excludes price paid for feedstock materials, upstream components, etc.).
5,000	*$/Unit*	The full price of the functional CCS apparatus is estimated at $5,000 per gallon of solvent.
100	*Metric tons CO2e*	Each gallon of solvent is expected to reduce 1,000 metric tons of CO2e per year.
1	*years*	The solvent is expecteed to last 20 years before replacement
50%	*%*	Half of the facility's solvent will be sold into the cleaning products market, so only 50% of the facility's output is dedicated to eligible technologies.

Instructions for Recyclers of Qualified Energy Properties

User Input	Calculated or from other tab	Instructions are in yellow b

Recycling facilities of qualified energy properties should complete each green cell on this tab to indicate annu
(input) and the products (output) and associated production information. Applicants may reference the exan

Fuel Information

Input Technology Area		**If selected 'Other', explain here**
Output Technology Area		**If selected 'Other', explain here**

Annual Attributable Production Capacity (AAPC)

Descriptor	**Data**	**Units**
Recovery Rate		*Mass/Unit*
Annual Production Capacity		*Unit/year*

oxes next to the corresponding inputs
ual production. These metrics include the recycled properties
nple to the right and/or the Assumptions tab for assistance.

Select the most representative technology area for the recycling input. If the input is a critical material, use the critical material data sheet and application

Select the most representative technology area for the recycling output. If the output is a critical material, fill out the critical material data sheet

Notes/Instructions
Projected (not peak or potential) recovered rate
Projected (not peak or potential) number of output units produced. Fill in the Unit column with the appropriate unit e.g. MWh, tonnes, etc

EXAMPLE			
Input Technology Area	Electric or fuel cell vehicles - 48C(c)(1)(A)(i)(VII)	**If selected 'Other', explain here**	Select the recycling ir material da
Output Technology Area	Electric or fuel cell vehicles - 48C(c)(1)(A)(i)(VII)	**If selected 'Other', explain here**	Select the recycling ir and write i

EXAMPLE			
Descriptor	**Data**	**Units**	**Notes/Inst**
Recovery Rate	0.5	*g Li/battery cell*	Projected (
Annual Production Capacity	100,000	*kg Li/year*	Manufactu batteries ir

most representative technology area for the ıput. If the input is a critical material, use the critical ata sheet and application
most representative technology area for the ıput. If the output is a critical material, select other n the critical material

:ructions
(not peak or potential) recovered rate
ırer produces 100,000 kg of of Lithium from recycled ıputs

Instructions for Manufacturers of Other Greenhouse Gas Reduction Equipment

User Input	Calculated or from other tab	Instructions are in yellow bo

Manufacturing facilities for other equipment designed to reduce greenhouse gas emissions should comp production. These include metrics to understand the performance of the product in its ultimate use. App and/or the Assumptions tab for assistance.

Provide Brief Description of Output			In 10 word and how it

Annual Attributable Production Capacity (AAPC)

Descriptor	**Data**	**Units**	**Notes/Inst**
Base Unit		Unit	Describe th
Annual Production Capacity		*Unit/year*	Projected (
Manufacturing Contribution		*$/Unit*	Value adde
Total Cost of Emissions Reduction Component		*$/Unit*	Price to en system) inc labor costs
CO2e Reduction Per Unit		*Metric tons CO2e/unit*	Annual CO For equipn use the "C
Deployed Property Lifetime		*years*	See *Assum* assumptio equipment
Share of Facility Output		*%*	Fraction of that will be

xes next to the corresponding inputs
plete each green cell on this tab to indicate annual
plicants may reference the example to the right

ls or less, describe what product the facility produces
reduces greenhouse gas emissions

ructions		Annual Attributable Production Ca
		Descriptor
ne unit of production		Base Unit
(not peak or potential) number of units		Annual Production Capacity
ed contribution to system (excludes price paid for		Manufacturing Contribution
d user of total system hardware (e.g., full CCS cluding balance of system but excluding installation		Total Cost of Emissions Reduction Component
2-equivalent emissions reductions per unit deployed. nent that reduces non-CO2 emissions, applicants can O2 Equivalency Assumptions" on the *Assumptions*		CO2e Reduction Per Unit
ptions tab for common capacity factors, based on ns of typical use. Number of years the deployed t will operate.		Deployed Property Lifetime
production from project (i.e., manufacturing facility) e allocated to produce energy efficiency technology.		Share of Facility Output

apacity (AAPC)		
Data	**Units**	**Notes/Instructions**
gallon	Unit	Describe the unit of production
100,000	*Unit/year*	A manufacturer projects that its new factory will produce 100,000 gallons of a solvent that can be used in carbon capture
450	*$/Unit*	Value added contribution to system (excludes price paid for feedstock materials, upstream components, etc.)
5,000	*$/Unit*	The full price of the functional CCS apparatus is estimated at $5,000 per gallon of solvent.
100	*Metric tons CO2e*	Each gallon of solvent is expected to reduce 1,000 metric tons of CO2e per year.
20	*years*	The solvent is expecteed to last 20 years before replacement
50%	*%*	Half of the facility's solvent will be sold into the cleaning products market, so only 50% of the facility's output is dedicated to eligible technologies.

Baseline Cost Metrics and Conversion Factors	
Metric	**Value**
Average U.S. Retail Electricity Rates (2021)	
Residential	11.8
Commercial	10.29
Utility	6.88
Average U.S. Gasoline Prices (2021)	3.35
Average Electricity Emissions (2021)	0.709
Average Gasoline Emissions (2021) (gCO2e/MJ of GGE)	93
Average Natural Gas Emissions	
MJ per gallon of gasoline	120
BTUs per gallon of gasoline	114,000
Annual Miles Traveled (average new light-duty vehicle)	10,850
Baseline Vehicle Fuel Economy	24
Vehicle Cost (2021 average new light-duty vehicle)	42,000

Renewable, Low-Carbon, or Low-Emissions Fuel, Chemical or Product	
Product and Process	**Core LCA (gCO2e/MJ)**
	Data from ICAO & ANL GREE
Gasoline	93
Alcohol to jet from ethanol - gasification - wood waste	TBD
Alcohol to jet from ethanol - gasification - municipal solid waste	TBD
Alcohol to jet from ethanol - fermentation - corn grain/starch	65.7
Alcohol to jet from ethanol - fermentation - corn stover	TBD
Alcohol to jet from ethanol - fermentation - industrial off-gases	TBD
Alcohol to jet from isobutanol - fermentation - corn grain/starch	55.8
Alcohol to jet from isobutanol - fermentation - corn stover	TBD
Alcohol to jet from isobutanol - fermentation - forest residue	23.8
Alcohol to jet from isobutanol - fermentation - miscanthus, switchgrass	43.4
Hydroprocessed ethers and fatty acids (HEFA) - tallow/animal fat	22.5
Hydroprocessed ethers and fatty acids (HEFA) - used cooking oil	13.9
Hydroprocessed ethers and fatty acids (HEFA) - corn oil	17.2
Hydroprocessed ethers and fatty acids (HEFA) - soybean oil	40.4
Fischer-tropsch - forest residue	8.3
Fischer-tropsch - woody energy crops	12.2
Fischer-tropsch - miscanthus, switchgrass	10.4
Fischer-tropsch - municipal solid waste	5.2
Ex-situ catalytic fast pyrolysis (CFP) - woody biomass	TBD
Ethanol - fermentation - corn grain/starch	TBD
Ethanol - fermentation - corn stover	TBD
Ethanol - gasification w/ syngas fermentation - corn stover	TBD
Ethanol - gasification w/ syngas fermentation - forest residue	TBD
Ethanol - gasification w/ syngas fermentation - switchgrass	TBD
Ethanol - gasification w/ syngas fermentation - municipal solid waste	TBD
Ethanol - gasification w/ syngas fermentation - wood waste	TBD
Ethanol - gasification w/ syngas fermentation - industrial waste gas	TBD
Biodiesel/FAME - tallow/animal fat	TBD
Biodiesel/FAME - used cooking oil	TBD

Biodiesel/FAME - cellulosic feedstocks	TBD
Renewable natural gas/biomethane - landfill gas	TBD
Renewable natural gas/biomethane - manure	TBD
Renewable propane	TBD
Renewable naphtha/gasoline	TBD
Gaseous Hydrogen - Renewable Electrolysis	0

Common Service Life Assumptions	
Technology	**Service Life Years**
General suggestion (for technologies excluded below)	*20*
Distributed Solar Photovoltaics - Modules	26
Distributed Solar Photovoltaics - Inverters	21
Distributed Wind	20
Battery Storage - Cells	10
Battery Storage - String Inverters	15
Fuel Cell	10
Micro Turbine	10
Air-Source Heat Pump	9 to 22
Electric Rooftop Heat Pump	21
Ground-Source Heat Pump	8 to 21
Grid Modernization Equipment	25
Light-duty Vehicle	16
Utility-scale PV	30
Utility-scale Wind	30
Utility-scale Fuel Cells	30
Utility-scale Combustion Turbines	30

Common Capacity Factor Assumptions	
End Use Energy Product (Technology)	**Capacity Factor (%)**
Biomass (general)	52%
Geothermal	73%
Grid - Transmission/Transportation	65%
Grid Equipment - Interconnection	80%
Landfill gas utilization (general)	80%
Solar Thermal	28%
Solar Photovoltaic (general)	20%
Storage	10%
Storage – Pumped Hydro	N/A
Storage – Adv. Batteries	10%
Storage – Flywheel	N/A
Wind	44%
Wind – Offshore	42%

CO2 Equivalency Assumptions	
Original Metric	**CO2e Emissions (metric ton**
Metric ton of CO2	1
Metric ton of Methane	22.7
Metric ton of Nitrous Oxide	270

Metric ton of HFCs/PFCs	Various (use EPA calculator
Metric ton of SF6	20,684
Gallon of gasoline avoided	0.009
Megawatt-hour of electricity avoided	0.709

Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Units
cents/kWh
cents/kWh
c/kWh
$/gallon
metric tons CO2e/MWh
gCO2e/MJ of GGE
MJ/GGE
BTU/GGE
miles
mpg
$

	Reduction from Gasoline
ET	
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	#VALUE!
	-40%
	#VALUE!
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	-76%
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Notes
https://www.eia.gov/analysis/studies/buildings/dg_storage_chp/
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https://www.eia.gov/analysis/studies/buildings/equipcosts/
Note: Utility-scale technologies are evaluated using a 30-year investment recovery period. However, these technologies will remain in service as long as going-forward revenues (system value) exceed going-forward costs (variable and fixed operating costs). Thus actual service life may be shorter-than or substantially longer than 30-years.

Notes
Fleet capacity factor in 2021
Fleet capacity factor in 2021
Fleet capacity factor in 2021
Based on NEMS EMM Region 20 WECC Southwest
Based on ac kWh delivered and dc watts rated power (Use 25% if ac-to-ac)
Based on NEMS EMM Region 18 and 19: Southwest Power Pool Central and North
Based on NEMS EMM Region 7 NPCC New England

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below)