

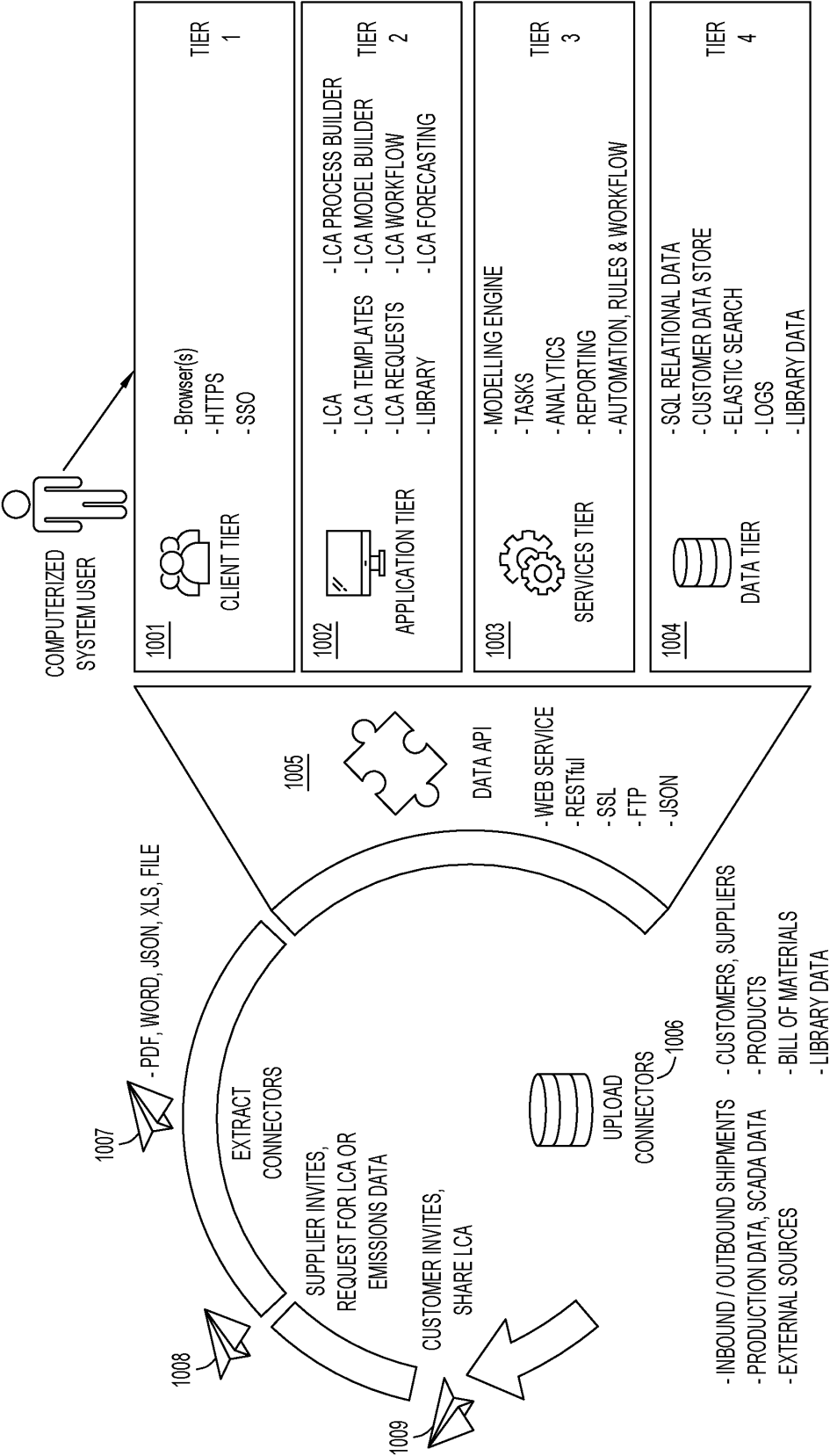


FIG.1

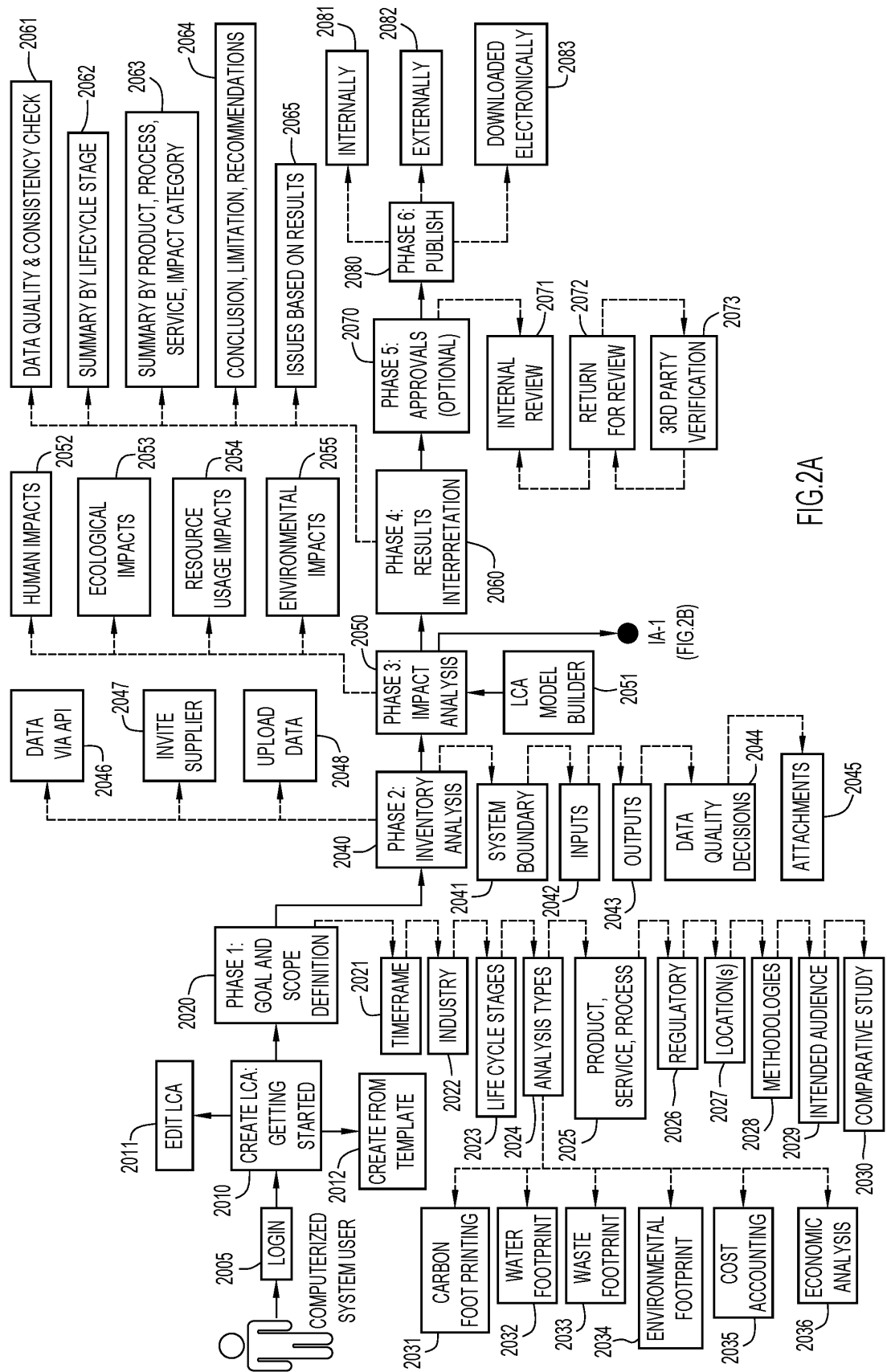


FIG.2A

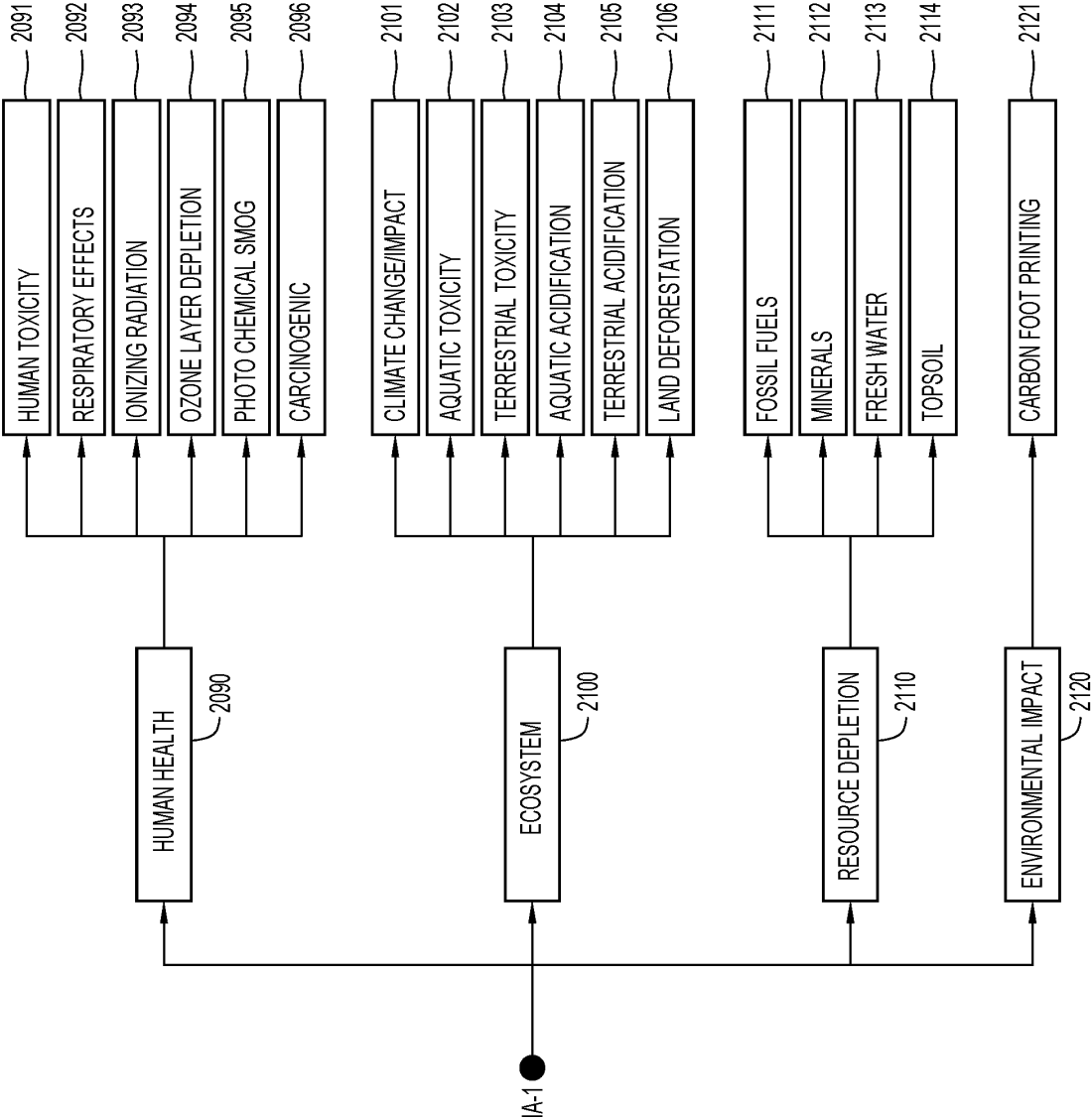


FIG.2B

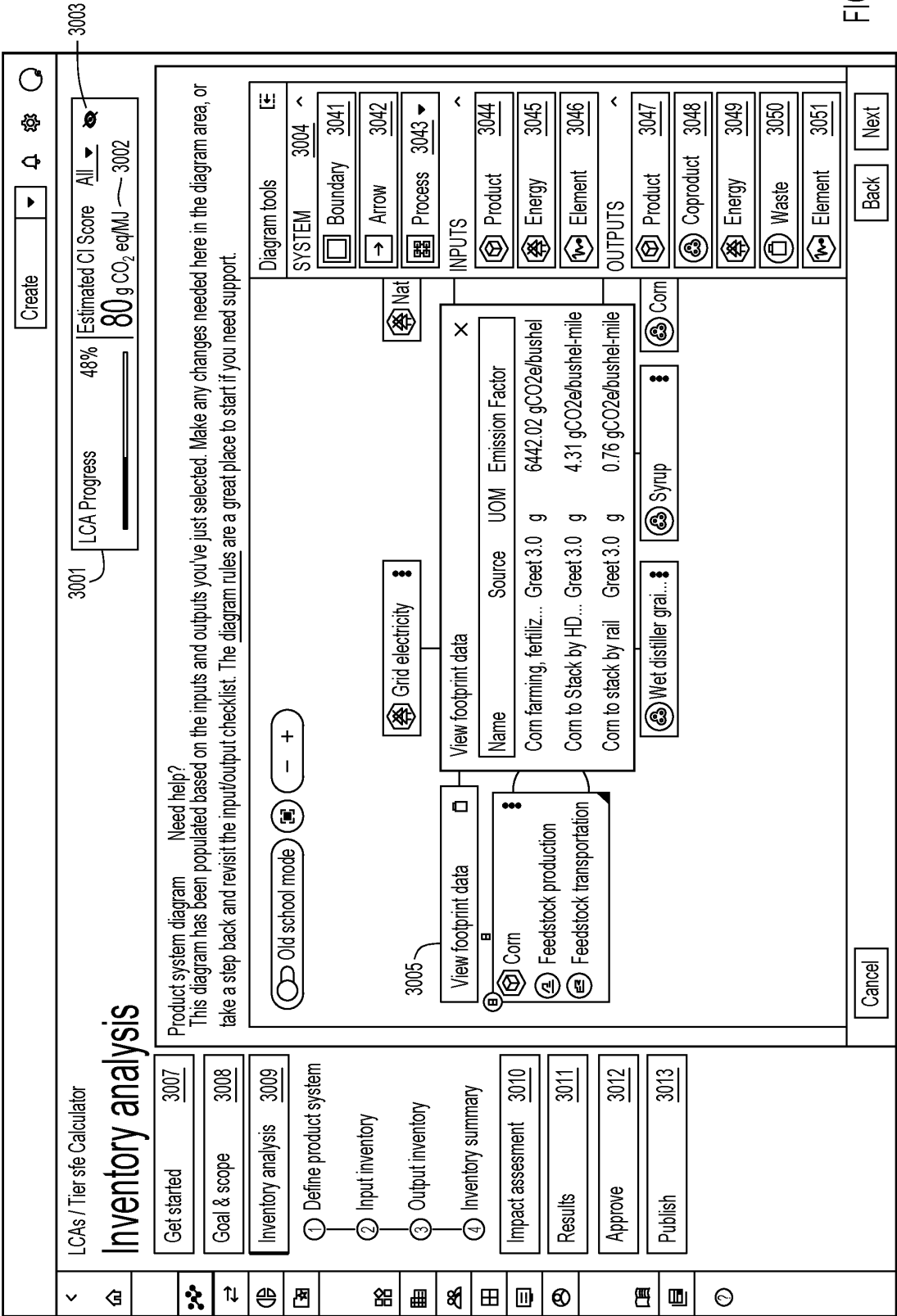


FIG.3

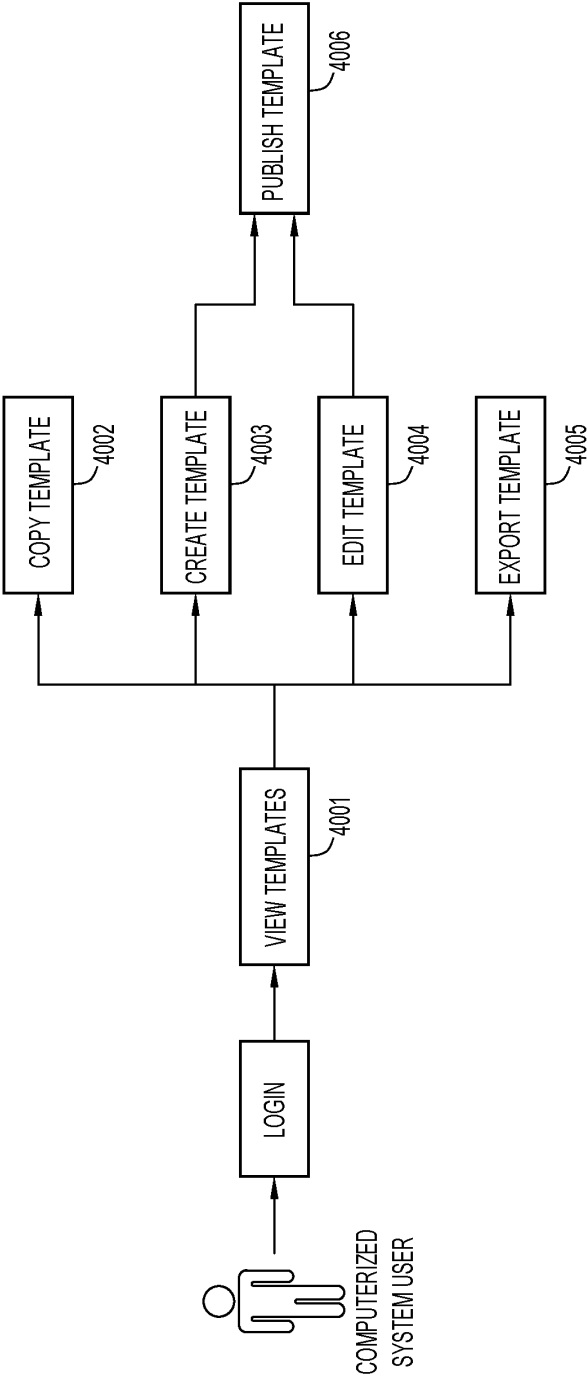


FIG.4A

Create

Templates

Search

Columns

Filters

Export

☐ Name	Template ID	Product type	Updated date	Updated by
☐ Template Name 1	12345	Biofuel		
☐ Template Name 2	12345	Biofuel		
☐ Template Name 3	12345	Biofuel		
☐ Template Name 4	12345	Biofuel		
☐ Template Name 5	12345	Biofuel		
☐ Template Name 6	12345	Biofuel		
☐ Template Name 7	12345	Biofuel		
☐ Template Name 8	12345	Biofuel		
☐ Template Name 9	12345	Biofuel		

Rows per page: 25 ▼

<

>

1

Show results: 3 of 3

FIG.4B

Templates / Create a template / Structure

Structure

Structure

Goal & scope

Inventory analysis

Results

Publish

Create

Template progress

12%

Specify template phases and sections

Need help?

Specify the phases and sections that will constitute your template to set the stage for an organized and thorough LCA process. These selections shape the subsequent steps you will need to complete to finalize the template itself. By defining the phases and sections upfront, you'll have a clear framework to fill out and generate comprehensive LCA reports effortlessly.

Select or deselect phases or sections below to complete your LCA template structure!

Select phases or sections to include

^ Goal & scope

You will define details for the phases and sections selected in the steps that follow

Study goal

Explain the intended application and reasons for conducting the LCA

Audience

Describe your audience

System boundary

Select the life cycle stages and steps (processes)

Functional unit

Define the functional unit

Locations

Select applicable locations

Allocation procedure

Select the allocation method to apply

Data requirements

Describe the data requirements

Assumptions

Describe expected study assumptions

Limitations

Describe expected study limitations

Data quality requirements

Describe the data quality requirements

Critical review

Specify the type of critical review

Include

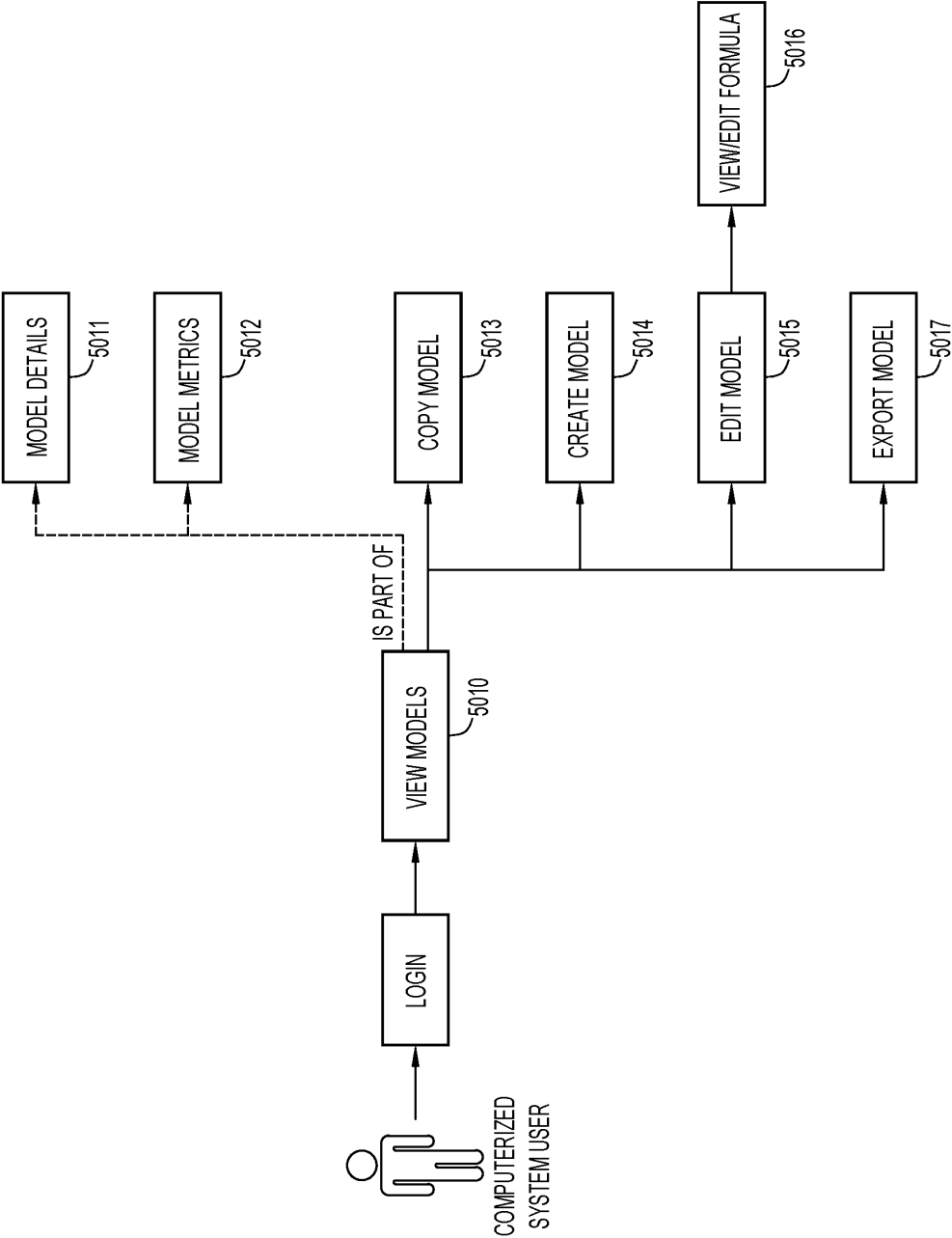


FIG. 5A

Models / Model Details

Carbon footprint base

Active

Details

Metrics

Search

Q

5035  Export

Input category — 5020			
Type — 5021	Subtype — 5022	Name — 5023	Formula — 5024
☐ Product/Material	-	Carbon equivalent	1 class ModelFormula(BaseModelFormula)...
☐ Product/Material	-	Carbon intensity	1 class ModelFormula(BaseModelFormula)...
☐ Energy	-	Carbon equivalent	1 class ModelFormula(BaseModelFormula)...
☐ Energy	-	Carbon intensity	1 class ModelFormula(BaseModelFormula)...
Output category — 5025			
Type	Subtype	Name	Formula
☐ Product/Co-product	-	Carbon equivalent	1 class ModelFormula(BaseModelFormula)...
☐ Product/Co-product	-	Carbon intensity	1 class ModelFormula(BaseModelFormula)...
☐ Waste	-	Carbon equivalent	1 class ModelFormula(BaseModelFormula)...
☐ Waste	-	Carbon intensity	1 class ModelFormula(BaseModelFormula)...
Lifecycle stage category — 5030			
Type	Subtype	Name	Formula
☐ Extract Raw Material	-	Carbon equivalent	1 class ModelFormula(BaseModelFormula)...

FIG.5B

Models / Create Model

Create model

1 Add model details

2 Perform calculation

3 Review summary

Calculation

Need help?

Define the formulas to be included in this model by describing what the formula is for and then writing the python code for the formula itself. After describing the formula (selecting a category, type and an optional sub-type), a list of available attributes will be available to reference and utilize to complete the formula script.

Input

Product

Soybean oil

Metric category

Input

5055

Metric type

Product

5060

Metric sub-type

Soybean oil

5065

5070

Duplicate

Delete

Reference formulas

Reference fields

Operator:

+

-

÷

×

=

▼

Operator:

and

or

not

if

▼

Clear

1 class ModelFormula(BaseModelFormula)

2 metric_property = "INPUT"

3 metric_type = "PRODUCT"

4 sub_type = "SOYBEAN_OIL"

5

6 def calculation(data):

7 self.formulas.carbon_equivalent(data) + self.attributes.functional_unit(data)

Formula 1

Duplicate

Delete

Metric category

▼

Add new formula +

Cancel

Back

Next

FIG.5C

10/22

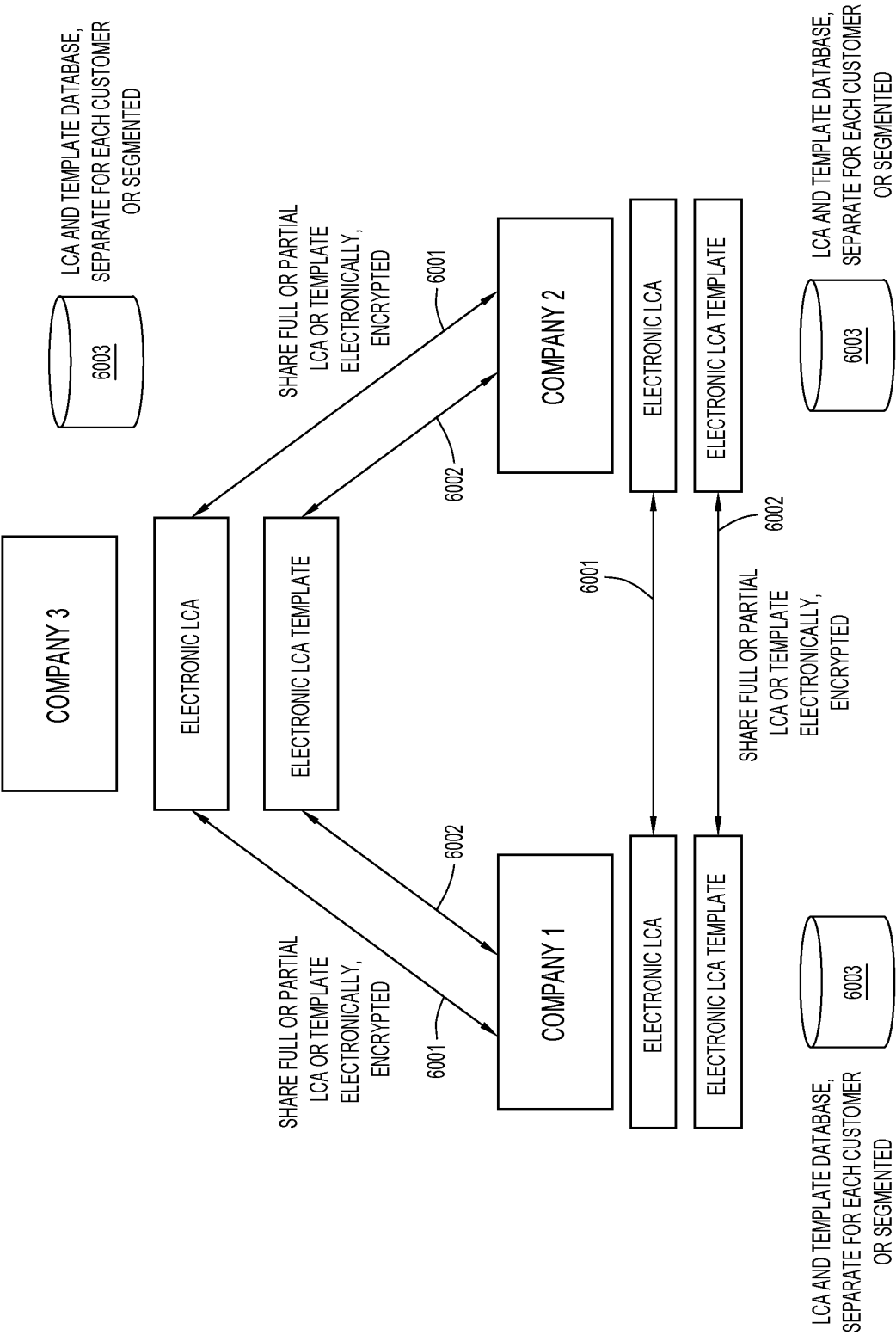


FIG.6

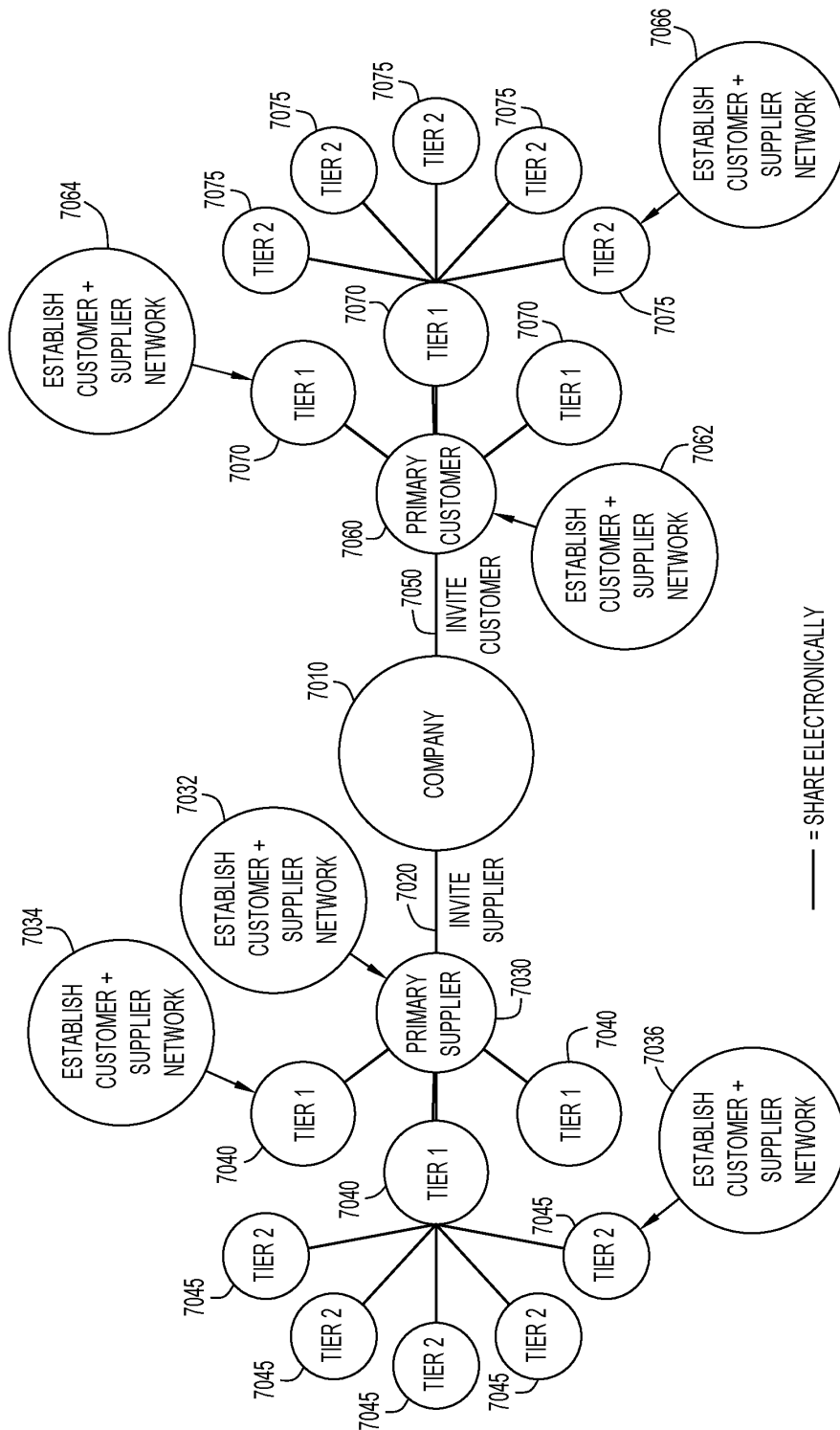


FIG. 7

Create

LCA Progress

80%

Final CI Score

40 g CO₂ eq/MJ

↓ 10

LCAs / Austin Facility - RD from Soybean

Results — 8010

Get started

Goal & scope

Inventory analysis

Impact assessment

Results

Insights

Report

Approve

Publish

Review LCA report

Need help?

View PDF

8011

Review the LCA report information that is generated based on all information contained in the LCA itself. Include or exclude sections from the report and then view and download the full report for use outside the platform. To proceed to the approval phase click "Next: Approve". — 8012

Get started summary — 8014

Include

☒

LCA Name

Austin Facility - RD from Soybean

Product template

CARB Renewable diesel

Product Name

Green diesel - Eco 100

Industry

Renewable fuels

Regulatory bodies

CARB/LCFS

Application number

A0235

Timeframe

5 months

Edit

☒

Edit

☒

Edit

☒

Edit

☒

Edit

☒

Edit

☒

Cancel

Back

Next: Approve

Results (continued)

Goal & scope	8015	Include	☒
Goal and scope description			☒
Goal	This study aims to evaluate the production of renewable diesel (RD) in a specific location and its compliance with the Low Carbon Fuel Standard (LCFS) and regulations defined by the California Air Resources Board (CARB). The primary objective is to assess the environmental performance of RD in comparison to conventional diesel, facilitating informed decisions on how to further reduce the carbon intensity (CI) of this pathway over time. The ultimate goal is to meet or surpass the annual reduction targets for RD set by the LCFS and CARB. By conducting this assessment, the organization contributes to the understanding of RD's environmental impact, enables effective decision-making for future carbon intensity reduction strategies, and supports CARB's efforts to promote sustainable and low-carbon transportation fuels.		
Scope	A well-to-wheel LCA will be performed. Standard values and emission factors as provided by CARB will be used in relevant formulas. The user needs to input the monthly raw data for electricity consumption, type of electricity mix, natural gas purchases, liquified gas produced, transportation type and miles. The final output will be a Carbon Intensity (CI) number with unit as grams CO2e/MJ. The CI number is linked to the impact category called "Global Warming Potential". The CI number if lower than CARB annual benchmark will accrue credits whereas deficits will be incurred in case CI is higher than annual threshold. If user defined values are utilized, the submitter will need to collaborate with CARB to get the emissions factors and other relevant standard values which is beyond the scope of this study. The CI results are primarily meant for CARB regulatory compliance which will be communicated via their official website.		
Audience	☒		
Internal			
Yes			
External			
Customers, Regulatory body (CARB)			

FIG.8B

Results (continued)

Study type Not a comparative study	☒
Analysis type Carbon footprint	☒
Functional unit 1 MJ	☒
Lifecycle stages Biogas production Biogas processing Biomethane production Biomethane transport CNG production LNG production LNG transport (truck, miles)	☒
Locations	☒
Location type Details Electricity mix Crude mix Natural gas source Manufacturing facility Austin, TX 78665 ERCOT, 638.59 g CO₂e/kWh 5 U.S. Average Crude 5 U.S. Average NG	
Edit	

FIG.8C

Results (continued)

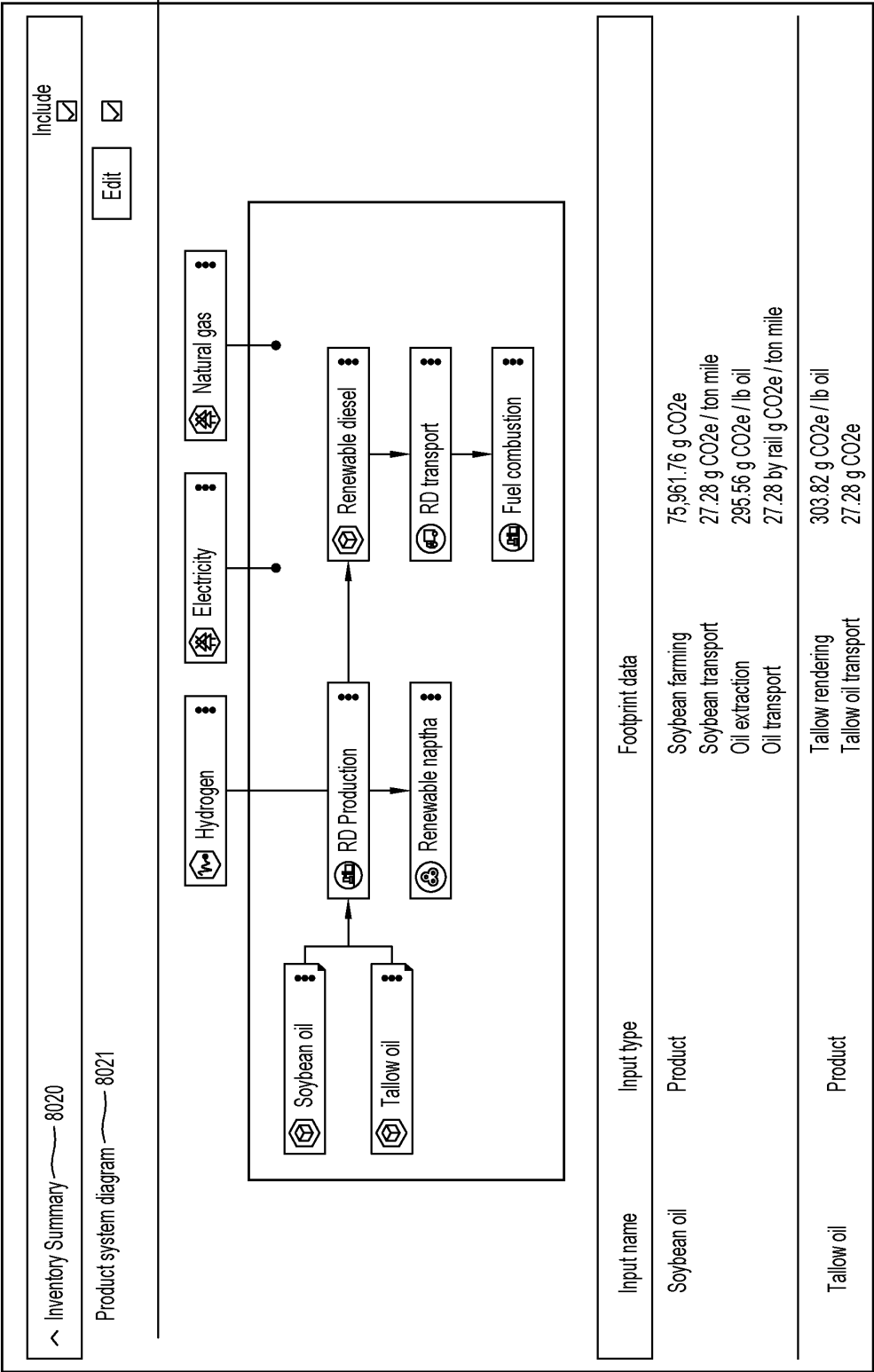


FIG.8D

Results (continued)

< Input inventory summary — 8022

Input name

Supplier

Inventory

Soybean oil

Supplier1

Oil used

200,000 lbs

Natural gas

Supplier2

Energy consumption

47,000 HHV in HHBtu

Electricity

Supplier3

Energy consumption

1,310,000 kWh

Tallow oil

Supplier4

Oil used

15,733,235

Edit

< Output inventory summary — 8023

Output name

Transportation

Inventory

Renewable diesel

Rail

Quantity produced

2,000,000 gal

Renewable naphtha

1,000 miles

Quantity produced

165,000 gal

Edit

FIG.8E

Results (continued)

^

Impact assessment summary

8030

Include☒

Model

☒

Model name

Simplified CI calculator for Renewable Diesel

Model description

The calculator utilized by this model was updated with automation capabilities to conduct CI (Carbon Intensity) calculations by utilizing factors derived from the CA-GREET3.0 model. This version of the calculator replaces the previous Calculator and operational data template in pathway application packages. As part of CI calculation process for BD (Biodiesel) and RD (Renewable Diesel), applicants provide specific facility information and verifiable monthly data regarding feedstock, operational energy consumption, fuel production, co-products, and transport distances. All inputs provided by applicants must adhere to requirements outlined in the monitoring plan for entities obligated to validate or verify under sections 95491.1(c) and may be subject to verification, except in cases where specific exemptions apply. The model calculator also includes emission factors used in CA-GREET3.0, reference fuel specifications and the calculators themselves used to calculate the CI of fuel pathways from various allowable feedstock and energy inputs.

Analysis type

Carbon footprint

Impact categories

Global warming potential (Climate change)

Calculator changes

Edit

☒

Calculator location

Change description

Change reason

Sheet: "Fuel Specs", cell B24

Hydrogen energy density changes from 290 Btu/cubic feet to 274 Btu/cubic feet

Original value is an inaccurate representation of hydrogen in the production of renewable diesel

Sheet: "RD - Production", cell K53

Renewable Naptha Energy Density value entered = 111, 520.00

Values agreed upon with CARB for energy density of renewable naptha. Documentation of this value entered is required

FIG.8F

Results (continued)

^ Result summary — 8035			Edit		Include ☒	
Intensity by lifecycle phase						
Lifecycle name		Intensity				
Lifecycle 1		-				
Lifecycle 2		-				
Lifecycle 3		-				
Lifecycle 4		-				
Intensity by input						
Product input name		Intensity			Timeframe	
Product input 1		-			All time	
Product input 2		-			All time	
Footprint by supplier						
Product input name		Intensity			Timeframe	
Product input 1		-			All time	
Product input 2		-			All time	

FIG.8G

Results (continued)

Energy intensity contribution			
Product input name	Intensity	Timeframe	
Product input 1	-	All time	
Product input 2	-	All time	
Production and intensity over time			
Month	Production	CI score	Average CI score
JAN	-	-	-
FEB	-	-	-
MAR	-	-	-
APR	-	-	-
MAY	-	-	-
JUN	-	-	-
JUL	-	-	-
AUG	-	-	-
SEP	-	-	-
OCT	-	-	-

FIG.8H

Create

LCA Progress

100%

Final CI Score

40 g CO₂ eq/MJ

↓ 10

LCAs / Austin Facility - RD from Soybean

Approve — 8040

Get started

Goal & scope

Inventory analysis

Impact assessment

Results

Approve

Publish

✓ Internal

✓ External

③ Summary

You've completed approvals

Need help?

Once all listed approvals are complete, you may proceed to the final stage by clicking "Next: Publish".

Approvals summary — 8041

~ Internal approvers

Name	Email	Status
		Approved 8042

Edit

~ External validators

Name	Email	Status
		Approved 8043
		In progress

Edit

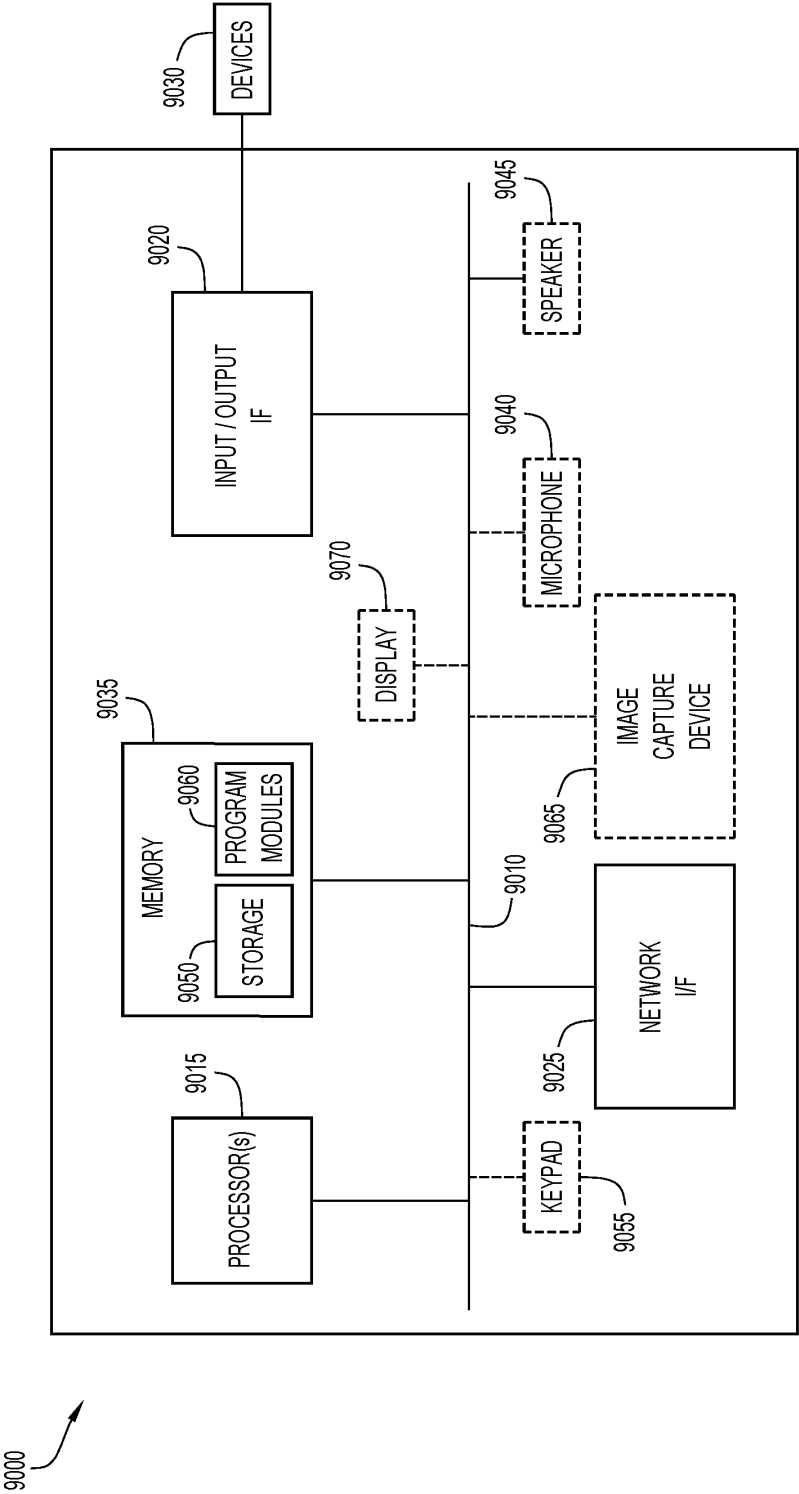


FIG.9