M.5.17	Demonstrate and validate product(s) from lignin or biomass derived syngas
M.5.17.1	Demonstrate high value chemical/material production (C3-C5 alcohols) from syngas
M.5.17.2	Validate product(s) separation
M.5.17.3	Validate integrated production of product(s) from syngas at pilot scale
M.5.17.4	Validate integrated production of product(s) from syngas at demonstration scale
M.5.18	Demonstrate and validate non-ethanol fuels from 5 biomass sugars that are econonomically viable
M.5.18.1	Validate fermentation of all 5 sugars to produce non-ethanol fuels
M.5.18.2	Optimize non-ethanol fuel separation
M.5.18.3	Optimize integrated production of non-ethanol fuels from sugars at pilot scale
M.5.18.4	Optimize integrated production of non-ethanol fuel from sugars at demonstration scale
M.5.19	Demonstrate and validate biomass pyrolysis to produce pyrolysis oil intermediate
M.5.19.1	Validate feeder systems to reliably feed solid biomass to pyrolysis reactor high pressure (30 bar) systems
M.5.19.2	Validate pyrolysis performance
M.5.19.3	Validate pyrolysis oil cleanup performance
M.5.19.4	Validate capital costs - ROI hurdle rate versus cost magnitude hurdle amount
M.5.19.5	Validate integrated pyrolysis and pyrolysis oil cleanup at pilot scale
M.5.19.6	Validate integrated pyrolysis and pyrolysis oil cleanup at demonstration scale
M.5.19.7	Validate feed flexibility in integrated system
M.5.20	Demonstrate and validate fuels from pyrolysis oil intermediate
M.5.20.1	Demonstrate fuel production from pyrolysis oil intermediate
M.5.20.2	Validate fuel separation
M.5.20.3	Validate integrated production of fuels from pyrolysis oil at pilot scale
M.5.20.4	Validate integrated production of fuels from pyrolysis oil at demonstration scale
M.5.21	Demonstrate and validate high value chemical and material products from pyrolysis oil intermediates
M.5.21.1	Demonstrate high value chemical/material production from pyrolysis oil
M.5.21.2	Validate product separation
M.5.21.3	Validate integrated production of product(s)from pyrolysis oil at pilot scale
M.5.21.4	Validate integrated production of product(s)from pyrolysis oil at demonstration scale
6. Forest Resources Processing	
Milestone #	**Milestone Title**
M.6	***Complete systems level demonstration and validation of technologies to improve pulp and paper mill facilities and/or produce additional products (fuels, chemicals and /or power) from wood feedstock in a pulp and paper mill environment***
JF.2010	Complete a core R&D engineering design that can receive multiple feedstock resources and preprocess them into cellulosic feedstock for an average of $35 per ton delivered to biorefineries.
JF.2011	In conjunction with USDA, land grant universities, and private sector, incorporate yield and othe data from field trials. Complete and validate dry and woody feedstocks at $35 per ton in line with 2012 goal.
JF.2012	Feedstocks (wet, dry, and woody) in support of $1.07 per gallon cost target will be validated on a regional basis.
M.6.1	Demonstrate and validate integrated logging residue and forest thinnings collection and logistics
M.6.1.1	Demonstrate sustainable logging practices
M.6.1.2	Demonstrate logging residue collection

M.6.1.3	Demonstrate forest thinnings collection
M.6.1.4	Demonstrate logging residue and forest thinnings transportation
M.6.1.5	Demonstrate quality and quantity of logging residue and forest thinnings available
M.6.1.6	Demonstrate logging residue and forest thinnings preprocessing benefits
M.6.1.7	Validate integrated logging residue and forest thinnings logistics in prototype equipment
M.6.1.8	Validate integrated logging residue and forest thinnings logistics at demonstration scale
M.6.2	Demonstrate and validate integrated fuel treatment biomass collection and logistics
M.6.2.1	Demonstrate fuel treatment biomass collection
M.6.2.2	Demonstrate fuel treatment biomass storage
M.6.2.3	Demonstrate fuel treatment biomass transportation
M.6.2.4	Demonstrate fuel treatment biomass quality and quantity of available
M.6.2.5	Demonstrate fuel treatment biomass preprocessing benefits
M.6.2.6	Validate integrated fuel treatment biomass logistics in prototype equipment
M.6.2.7	Validate integrated fuel treatment biomass logistics at demonstration scale
M.6.3	Demonstrate and validate forest resources fractionation to produce mixed, dilute biomass sugars
M.6.3.1	Validate cellulase enzyme cost
M.6.3.2	Validate pretreatment technology cost
M.6.3.3	Demonstrate ability to economically satisfy internal heat and power demands
M.6.3.4	Validate capital cost
M.6.3.5	Validate integrated pretreatment and enzymatic hydrolysis at pilot scale
M.6.3.6	Validate integrated pretreatment and enzymatic hydrolysis at demonstration scale
M.6.3.7	Validate feed flexibility in integrated system
M.6.4	Demonstrate and validate ethanol from 5 biomass sugars
M.6.4.1	Validate fermentation of all 5 sugars to produce ethanol
M.6.4.2	Optimize ethanol separation
M.6.4.3	Optimize integrated production of ethanol from sugars at pilot scale
M.6.4.4	Optimize integrated production of ethanol from sugars at demonstration scale
M.6.5	Demonstrate and validate non-ethanol fuels from 5 biomass sugars
M.6.5.1	Validate fermentation of all 5 sugars to produce non-ethanol fuels
M.6.5.2	Optimize fuel separation
M.6.5.3	Optimize integrated production of non-ethanol fuels from sugars at pilot scale
M.6.5.4	Optimize integrated production of non-ethanol fuels from sugars at demonstration scale
M.6.6	Demonstrate and validate chemical building blocks, chemicals or materials from 5 biomass sugars
M.6.6.1	Optimize chemical building blocks production
M.6.6.2	Optimize high value chemical production
M.6.6.3	Optimize product separation
M.6.6.4	Optimize integrated production of product(s) from sugars at pilot scale
M.6.6.5	Optimize integrated production of product(s) from sugars at demonstration scale
M.6.7	Demonstrate and validate fuel products from lignin intermediates
M.6.7.1	Demonstrate direct fuel production from lignin

M.6.7.2	Validate fuel product separation
M.6.7.3	Validate integrated production of fuel(s) from lignin at pilot scale
M.6.7.4	Validate integrated production of fuels(s) from lignin at demonstration scale
M.6.8	Demonstrate and validate high value chemical and material products from lignin intermediates
M.6.8.1	Demonstrate high value chemical/material production from lignin
M.6.8.2	Validate product separation
M.6.8.3	Validate integrated production of product(s) from lignin at pilot scale
M.6.8.4	Validate integrated production of product(s) from lignin at demonstration scale
M.6.9	Demonstrate and validate combined heat and power from lignin intermediates/residues
M 6.9.1	Demonstrate combined heat and power production from lignin
M 6.9.2	Validate integrated production of heat and power from lignin at pilot scale
M 6.9.3	Validate integrated production of heat and power from lignin at demonstration scale
M 6.10	Demonstrate and validate lignin gasification to produce syngas
M 6.10.1	Validate feeder system performance
M 6.10.2	Validate gasification performance
M 6.10.3	Validate gas cleanup performance
M 6.10.4	Validate capital cost
M 6.10.5	Validate integrated gasification and gas cleanup at pilot scale
M 6.10.6	Validate integrated gasification and gas cleanup at demonstration scale
M 6.11	Demonstrate and validate cost-effective biomass gasification of wood, forest residues and other process residues and synthesis gas cleanup in a forest resources mill environment
M 6.11.1	Develop cost effective gasification designs for syngas production at appropriate scale
M 6.11.2	Validate feeder system performance to reliably feed solids to high pressure (30 bar) systems)
M 6.11.3	Validate gasification performance
M 6.11.4	Validate cost-effective gas cleanup performance
M 6.11.5	Validate integrated biomass gasification and syngas cleanup process at pilot scale
M 6.11.6	Validate integrated biomass gasification and syngas cleanup process in a forest resources mill environment
	Validate feed flexibility in integrated system
JT.2007	Demonstrate conversion of 50% of non-methane (C2+ higher) hydrocarbons that result in a syngas cost of $7.15/MBtu in 2007.
JT.2009	Validate technology capable of economically converting biomass residues, pulping liquors or waste fats and greases to synthesis gas or bio-oils that are suitable for fuels and chemicals produciton. The target is a modeled cost of $5.81/Mbtu in 2009.
JT.2010	Validate and demonstrate technology for the cost-effective cleanup of biomass synthesis gas leading to a modeled syngas cost of $5.40/Mbtu in 2010.
M 6.12	Demonstrate and validate production of ethanol from syngas in a forest resources mill environment
M 6.12.1	Produce mixed alcohols from syngas
M 6.12.2	Recover ethanol fuel product
M 6.12.3	Validate integrated process at pilot scale
M 6.12.4	Validate new process in a forest resources mill environment
M 6.13	Demonstrate and validate production of non-ethanol fuels from syngas in a forest resources mill environment
M 6.13.1	Produce non-ethanol fuel from biomass syngas

M 6.13.2	Recover fuel product
M 6.13.3	Validate integrated process at pilot scale
M 6.13.4	Validate new process in a forest resources mill environment
M 6.14	Demonstrate and validate hydrogen production from lignin or biomass derived syngas forest resources mill environment
M 6.14.1	Demonstrate optimized hydrogen production from syngas
M 6.14.2	Validate hydrogen separation/recovery
M 6.14.3	Validate integrated production of hydrogen from syngas at pilot scale
M 6.14.4	Validate integrated production of hydrogen from syngas at demonstration scale
M 6.15	Demonstrate and validate product(s) from lignin or biomass derived syngas forest resources mill environment
M 6.15.1	Demonstrate high value chemical/material productionfrom syngas
M 6.15.2	Validate product(s) separation
M 6.15.3	Validate integrated production of product(s) from syngas at pilot scale
M 6.15.4	Validate integrated production of product(s) from syngas at demonstration scale
M 6.16	Demonstrate and validate syngas utilization for combined heat and power in a forest resources mill environment
M 6.16.1	Verify fuel gas quality to levels necessary for CHP or clean cold gas consuming equipment
M 6.16.2	Validate CHP from syngas and/or direct use of sygas in process equipment
M 6.16.3	Validate integrated process at pilot scale
M 6.16.4	Validate new process in a forest resources mill environment
M 6.17	Demonstrate and validate bio-oil production to a stable intermediate forest resources mill environment
M 6.17.1	Validate bio-oil production
M 6.17.2	Validate bio-oil inermediate recovery
M 6.17.3	Validate integrated process for producing bio-oil at pilot scale
M 6.17.4	Demonstrate and validate new process in a forest resources mill environment
M 6.17.5	Validate feed flexibility in integrated system
M 6.18.	Achieve cost-effective conversion bio-oil intermediate into product(s) in a forest resources mill environment
M 6.18.1	Validate production of products from bio-oil
M 6.18.2	Validate bio-oil product(s) recovery
M 6.18.3	Validate integrated process for producing bio-oil product at pilot scale
M 6.18.4	Validate integrated process in a forest resources mill environment
M 6.19.	Achieve cost-effective conversion bio-oil intermediate into product(s) in a forest resources mill environment
M 6.19.1	Validate production of products from bio-oil
M 6.19.2	Validate bio-oil product(s) recovery
M 6.19.3	Validate integrated process for producing bio-oil product at pilot scale
M 6.19.4	Validate integrated process in a forest resources mill environment
M 6.20	Demonstrate and validate cost-effective extraction of C5 and C6 sugars from hemicellulose upstream of the pulp digestor in a pulp mill without negatively impacting paper quality
M 6.20.1	Meet yield target for C5 and C6 sugars without negatively impacting paper quality
M 6.20.2	Meet sugar upgrading requirements
M 6.20.3	Meet targets for recovery of other intermediates
M 6.20.4	Validate integrated sugar extraction process at pilot scale

M 6.20.5	Validate sugar extraction process in pulp and paper mill
M 6.21	Demonstrate and validate reliable and economic gasification of spent pulping liquor, recycle liquor causticization, chemical recovery and gas cleanup in a pulp mill
M 6.21.1	Validate reliable and economic performance of gasification of spent pulping liquor
M 6.21.2	Validate cost effective causticization and return Na based pulping chemicals
M 6.21.3	Validate advantages of co-gasification of spent pulping liquors and other forms of biomass (woody, recycle paper streams, and bio-oil)
M 6.21.4	Validate process chemical recovery from spent pulping liquor syngas
M 6.21.5	Validategas cleanup technologies on spent pulping liquor syngas
M 6.21.6	Validate integrated black liquor gasification, causticization, chemical recovery and gas cleanup process at pilot scale
M 6.21.7	Validate integrated black liquor gasification, causticization, chemical recovery and gas cleanup process in pulp and paper mill
JB.2011	Demonstrate the conversion of synthesis gas or bio-oils, derived from biomass pulping liquors or waste fats and greases to chemicals or transportation fuels. The target modeled cost is $5.25/Mbtu in 2011.
7. Waste Processing Pathway	
Milestone #	**Milestone Title**
M.7	***Complete systems level demonstration and validation of technologies to process waste biomass streams to produce fuels, chemicals and /or power.***
M.7.1	Demonstrate and validate fractionation of carbohydrate rich waste streams to produce mixed, dilute biomass sugars
M.7.1.1	Validate cellulase enzyme cost
M.7.1.2	Validate pretreatment technology cost
M.7.1.3	Demonstrate ability to economically satisfy internal heat and power demands
M.7.1.4	Validate capital cost
M.7.1.5	Validate integrated pretreatment and enzymatic hydrolysis at pilot scale
M.7.1.6	Validate integrated pretreatment and enzymatic hydrolysis at demonstration scale
M.7.1.7	Validate feed flexibility in integrated system
M.7.2	Demonstrate and validate ethanol from 5 biomass sugars
M.7.2.1	Validate fermentation of all 5 sugars to produce ethanol
M.7.2.2	Optimize ethanol separation
M.7.2.3	Optimize integrated production of ethanol from sugars at pilot scale
M.7.2.4	Optimize integrated production of ethanol from sugars at demonstration scale
M.7.3	Demonstrate and validate non-ethanol fuels from 5 biomass sugars
M.7.3.1	Validate fermentation of all 5 sugars to produce non-ethanol fuels
M.7.3.2	Optimize non-ethanol fuel separation
M.7.3.3	Optimize integrated production of non-ethanol fuels from sugars at pilot scale
M.7.3.4	Optimize integrated production of non-ethanol fuel from sugars at demonstration scale
M.7.4	Demonstrate and validate chemical building blocks, chemicals or materials from 5 biomass sugars
M.7.4.1	Optimize chemical building blocks production
M.7.4.2	Optimize high value chemical production
M.7.4.3	Optimize product separation
M.7.4.4	Optimize integrated production of product(s)from sugars at pilot scale
M.7.4.5	Optimize integrated production of product(s)from sugars at demonstration scale

M.7.6	Demonstrate and validate high value chemical and material products from lignin intermediates
M.7.6.1	Demonstrate high value chemical/material production from lignin
M.7.6.2	Validate product separation
M.7.6.3	Validate integrated production of product(s)from lignin at pilot scale
M.7.6.4	Validate integrated production of product(s)from lignin at demonstration scale
M.7.5	Demonstrate and validate fuel products from lignin intermediates
M.7.5.1	Demonstrate direct fuel production from lignin
M.7.5.2	Validate fuel product separation
M.7.5.3	Validate integrated production of fuel(s)from lignin at pilot scale
M.7.5.4	Validate integrated production of fuels(s)from lignin at demonstration scale
M.7.7	Demonstrate and validate combined heat and power from lignin intermediates/residues
M.7.7.1	Demonstrate combined heat and power production from lignin
M.7.7.2	Validate integrated production of heat and power from lignin at pilot scale
M.7.7.3	Validate integrated production of heat and power from lignin at demonstration scale
M.7.8	Demonstrate and validate lignin gasification to produce syngas
M.7.8.1	Validate feeder system performance
M.7.8.2	Validate gasification performance
M.7.8.3	Validate gas cleanup performance
M.7.8.4	Validate capital costs
M.7.8.5	Validate integrated gasification and gas cleanup at pilot scale
M.7.8.6	Validate integrated gasification and gas cleanupat demonstration scale
M.7.9	Demonstrate and validate waste biomass gasification to produce syngas
M.7.9.1	Validate feeder systems to reliably feed solid biomass to high pressure (30 bar) systems
M.7.9.2	Validate gasification performance
M.7.9.3	Validate gas cleanup performance
M.7.9.4	Validate capital costs
M.7.9.5	Validate integrated gasification and gas cleanup at pilot scale
M.7.9.6	Validate integrated gasification and gas cleanupat demonstration scale
M.7.9.7	Validate feed flexibility in integrated system
JT.2009	Validate technology capable of economically converting biomass residues, pulping liquors or waste fats and greases to synthesis gas or bio-oils that are suitable for fuels and chemicals produciton. The target is a modeled cost of $5.81/Mbtu in 2009.
M.7.10	Demonstrate and validate ethanol from mixed alcohols using lignin or waste biomass derived syngas
M.7.10.1	Demonstrate ethanol production from mixed alcohols
M.7.10.2	Validate ethanol separation
M.7.10.3	Validate integrated production of ethanol from syngas at pilot scale
M.7.10.4	Validate integrated production of ethanol from syngas at demonstration scale
JB.2011	Demonstrate the conversion of synthesis gas or bio-oils, derived from biomass pulping liquors or waste fats and greases to chemicals or transportation fuels. The target modeled cost is $5.25/Mbtu in 2011.
M.7.11	Demonstrate and validate non-ethanol fuels from lignin or waste biomass derived syngas
M.7.11.1	Demonstrate non-ethanol fuel production from lignin or biomass-derived syngas

M.7.11.2	Validate non-ethanol fuel separation
M.7.11.3	Validate integrated production of non-ethanol fuels from syngas at pilot scale
M.7.11.4	Validate integrated production of non-ethanol fuels from syngas at demonstration scale
M.7.12	Demonstrate and validate hydrogen production from lignin or waste biomass derived syngas
M.7.12.1	Demonstrate optimized hydrogen production from syngas
M.7.12.2	Validate hydrogen separation/recovery
M.7.12.3	Validate integrated production of hydrogen from syngas at pilot scale
M.7.12.4	Validate integrated production of hydrogen from syngas at demonstration scale
M.7.13	Demonstrate and validate product(s) from lignin or waste biomass derived syngas
M.7.13.1	Demonstrate high value chemical/material production from syngas
M.7.13.2	Validate product(s) separation
M.7.13.3	Validate integrated production of product(s) from syngas at pilot scale
M.7.13.4	Validate integrated production of product(s) from syngas at demonstration scale
M.7.14	Demonstrate and validate combined heat and power production from lignin or waste biomass derived syngas
M.7.14.1	Demonstrate combined heat and power production from syngas
M.7.14.2	Validate integrated production of heat and power from syngas at pilot scale
M.7.14.3	Validate integrated production of heat and power from syngas at demonstration scale
M.7.15	Demonstrate and validate waste biomass pyrolysis to produce pyrolysis oil intermediate
M.7.15.1	Validate feeder systems to reliably feed solid biomass to pyrolysis reactor high pressure (30 bar) systems
M.7.15.2	Validate pyrolysis performance
M.7.15.3	Validate pyrolysis oil cleanup performance
M.7.15.4	Validate capital costs
M.7.15.5	Validate integrated pyrolysis and pyrolysis oil cleanup at pilot scale
M.7.15.6	Validate integrated pyrolysis and pyrolysis oil cleanup at demonstration scale
M.7.15.7	Validate feed flexibility in integrated system
M.7.16	Demonstrate and validate fuels from pyrolysis oil intermediate
M.7.16.1	Demonstrate fuel production from pyrolysis oil intermediate
M.7.16.2	Validate fuel separation
M.7.16.3	Validate integrated production of fuels from pyrolysis oil at pilot scale
M.7.16.4	Validate integrated production of fuels from pyrolysis oil at demonstration scale
M.7.17	Demonstrate and validate high value chemical and material products from pyrolysis oil intermediates
M.7.17.1	Demonstrate high value chemical/material production from pyrolysis oil
M.7.17.2	Validate product separation
M.7.17.3	Validate integrated production of product(s)from pyrolysis oil at pilot scale
M.7.17.4	Validate integrated production of product(s)from pyrolysis oil at demonstration scale

Applicant Name: Solazyme

Award Number: DE-FOA-0000096

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Demonstration of Integrated Biorefinery Operations	81.087			$21,753,410		
2.						
3.						
4.						
5. Totals		$0		$21,753,410		

REDACTED EXEMPTION 4

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity (1) Period 1	(2) Period 2	(3) Period 3	(4)	Total (5)
a. Personnel					
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. **Totals** (sum of 6i-6j)					
7. Program Income					

REDACTED EXEMPTION 4

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Section C - Non-Federal Resources

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) **Totals**
8. Demonstration of Integrated Biorefinery Operations				
9.				
10.				
11.				
12. **Total** (sum of lines 8 - 11)				

REDACTED EXEMPTION 4

Section D - Forecasted Cash Needs

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter

13. Federal	$3,350,954	$219,949	$529,669	$219,975	$2,381,360
14. Non-Federal					
15. **Total** (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project

(a) Grant Program	Future Funding Periods (Years) (b) First	(c) Second	(d) Third	(e) Fourth
16. Demonstration of Integrated Biorefinery Operations				
17.				
18.				
19.				
20. **Total** (sum of lines 16-19)				

Section F - Other Budget Information

21. Direct Charges	22. Indirect Charges

23. Remarks

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Instructions for the SF-424A

Public Reporting Burden for this collection of information is estimated to average 3.0 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Please do not return your completed form to the Office of Management and Budget; send it to the address provided by the sponsoring agency.

General Instructions
This form is designed so that application can be made for funds from one or more grant programs. In preparing the budget, adhere to any existing Federal grantor agency guidelines which prescribe how and whether budgeted amounts should be separately shown for different functions or activities within the program. For some programs, grantor agencies may require budgets to be separately shown by function or activity. For other programs, grantor agencies may require a breakdown by function or activity. Sections A, B, C, and D should include budget estimates for the whole project except when applying for assistance which requires Federal authorization in annual or other funding period increments. In the later case, Sections A, B, C, and D should provide the budget for the first budget period (usually a year) and Section E should present the need for Federal assistance in the subsequent budget periods. All applications should contain a breakdown by the object class categories shown in Lines a-k of Section B.

Section A. Budget Summary Lines 1-4 Columns (a) and (b)
For applications pertaining to a **single** Federal grant program (Federal Domestic Assistance Catalog number) and **not requiring** a functional or activity breakdown, enter on Line 1 under Column (a) the catalog program title and the catalog number in Column (b).

For applications pertaining to a **single** program **requiring** budget amounts by multiple functions or activities, enter the name of each activity or function on each line in Column (a), and enter the catalog number in Column (b). For applications pertaining to multiple programs where none of the programs require a breakdown by function or activity, enter the catalog program title on each line in **Column** (a) and the respective catalog number on each line in Column (b).
For applications pertaining to **multiple** programs where one or more programs **require** a breakdown by function or activity, prepare a separate sheet for each program requiring the breakdown. Additional sheets should be used when one form does

For continuing grant program applications, submit these forms before the end of each funding period as required by the grantor agency. Enter in Columns (c) and (d) the estimated amounts of funds which will remain unobligated at the end of the grant funding period only if the Federal grantor agency instructions provide for this. Otherwise, leave these columns blank. Enter in columns (e) and (f) the amounts of funds needed for the upcoming period. The amount(s) in Column (g) should be the sum of amounts in Columns (e) and (f).

For supplemental grants and changes to existing grants, do not use Columns (c) and (d). Enter in Column (e) the amount of the increase or decrease of Federal funds and enter in Column (f) the amount of the increase or decrease of non-Federal funds. In Column (g) enter the new total budgeted amount (Federal and non-Federal) which includes the total previous authorized budgeted amounts plus or minus, as appropriate, the amounts shown in Columns (e) and (f). The amount(s) in Column (g) should not equal the sum of amounts in Columns (e) and (f).

Line 5—Show the totals for all columns used.

Section B. Budget Categories
In the column headings (a) through (4), enter the titles of the same programs, functions, and activities shown on Lines 1-4, Column (a), Section A. When additional sheets are prepared for Section A, provide similar column headings on each sheet. For each program, function or activity, fill in the total requirements for funds (both Federal and non-Federal) by object class categories.

Lines 6a-i—Show the totals of Lines 6a to 6h in each column.

Line 6j—Show the amount of indirect cost.

not provide adequate space for all breakdown of data required. However, when more than one sheet is used, the first page should provide the summary totals by programs.

Lines 1-4, Columns (c) through (g)

For new applications, leave Columns (c) and (d) blank. For each line entry in Columns (a) and (b), enter in Columns (e), (f), and (g) the appropriate amounts of funds needed to support the project for the first funding period (usually a year).

Line 6k—Enter the total of amounts on Lines 6i and 6j. For all applications for new grants and continuation grants the total amount in column (5), Line 6k, should be the same as the total amount shown in Section A, Column (g), Line 5. For supplemental grants and changes to grants, the total amount of the increase or decrease as shown in Columns (1)-(4), Line 6k should be the same as the sum of the amounts in Section A, Columns (e) and (f) on Line 5.

Line 7—Enter the estimated amount of income, if any, expected to be generated from this project. Do not add or subtract this amount from the total project amount. Show under the program narrative statement the nature and source of income. The estimated amount of program income may be considered by the federal grantor agency in determining the total amount of the grant.

Section C. Non-Federal Resources

Lines 8-11—Enter amounts of non-Federal resources that will be used on the grant. If in-kind contributions are included, provide a brief explanation on a separate sheet.

Column (a)—Enter the program titles identical to Column (a), Section A. A breakdown by function or activity is not necessary.

Column (b)—Enter the contribution to be made by the applicant.

Column (c)—Enter the amount of the State's cash and in-kind contribution if the applicant is not a State or State agency. Applicants which are a State or State agencies should leave this column blank.

Column (d)—Enter the amount of cash and in-kind contributions to be made from all other sources.

Column (e)—Enter totals of Columns (b), (c), and (d).

Line 12—Enter the total for each of Columns (b)-(e). The amount in Column (e) should be equal to the amount on Line 5, Column (f) Section A.

Section D. Forecasted Cash Needs

Line 13—Enter the amount of cash needed by quarter from the grantor agency during the first year.

Line 14—Enter the amount of cash from all other sources needed by quarter during the first year.

Line 15—Enter the totals of amounts on Lines 13 and 14.

Section E. Budget Estimates of Federal Funds Needed for Balance of the Project

Lines 16-19—Enter in Column (a) the same grant program titles shown in Column
(a), Section A. A breakdown by function or activity is not necessary. For new applications and continuation grant applications, enter in the proper columns amounts of Federal funds which will be needed to complete the program or project over the succeeding funding periods (usually in years). This section need not be completed for revisions (amendments, changes, or supplements) to funds for the current year of existing grants.
If more than four lines are needed to list the program titles, submit additional schedules as necessary.

Line 20—Enter the total for each of the Columns (b)-(e). When additional schedules are prepared for this Section, annotate accordingly and show the overall totals on this line.

Section F. Other Budget Information

Line 21—Use this space to explain amounts for individual direct object-class cost categories that may appear to be out of the ordinary or to explain the details as required by the Federal grantor agency.

Line 22—Enter the type of indirect rate (provisional, predetermined, final or fixed) that will be in effect during the funding period, the estimated amount of the base to which the rate is applied, and the total indirect expense.

Line 23—Provide any other explanations or comments deemed necessary.

STATEMENT OF PROJECT OBJECTIVES

Solazyme, Inc.

Solazyme Integrated Biorefinery (SzIBR): Diesel Fuels from Heterotrophic Algae

A. PROJECT OBJECTIVES

Solazyme proposes to build, operate and optimize a pilot-scale "**Sola**z**y**me **I**ntegrated **Bio**refinery." SzIBR will demonstrate integrated scale-up of Solazyme's novel heterotrophic algal oil biomanufacturing process, validate the projected commercial-scale economics of producing multiple advanced biofuels, and enable Solazyme to collect the data necessary to complete design of the first commercial-scale facility.

Specific project objectives include:

- Expeditiously commence construction and operations.
- Integrate all process unit operations successfully into a unified biorefinery.
- Validate feasibility of low cost production at commercial scale.
- Demonstrate refining of the algal oil into fully-compliant liquid transportation fuels.
- Accelerate development of high-impact lignocellulosic feedstocks.
- Successfully complete the project on schedule.

B. PROJECT SCOPE

The scope of the proposed project encompasses (i) building, operating and optimizing a pilot-scale integrated biorefinery, (ii) cultivating fuel oil-producing algae , (iii) extracting and purifying oil from the algae, (iv) refining the algal oil to standard liquid transportation fuels, (v) optimizing fermentation parameters at both laboratory and pilot scale, and (vi) gathering data to assist in the design of subsequent demonstration and commercial facilities.

The project advances the goals of the DOE Biomass Program and accelerates the nation's ability to achieve the production targets mandated by the federal Renewable Fuel Standard (RFS).

C. TASKS TO BE PERFORMED

BUDGET PERIOD 1: PRELIMINARY ACTIVITIES

Task 1: Submit application for Period 2

Task 2: Complete NEPA process

The expected result is a Categorical Exclusion or Finding of No Significant Impact.

Task 3: Finalize risk management plan

Task 4: Prepare manufacturing site

Solazyme shall complete engineering drawings, submit permit applications, finalize specifications of equipment with vendors, finalize initial feedstock supply agreements, and

update the safety plan. Upon completion of this Task, Solazyme will have completed all preparatory work at the project site including receipt of the environmental air permit and be ready to begin construction.

Task 5: Prepare research site

Solazyme shall obtain permits (expect none required) and update the safety plan for the research site.

Task 6: Generate concentrated sugars derived from lignocellulosic feedstocks via enzymatic processes

Solazyme shall obtain sugars derived from lignocellulosic feedstocks to enable the work in Task 13 to commence immediately upon approval of Period 2.

Task 7: Generate concentrated sugars derived from lignocellulosic feedstocks via acid hydrolysis

Solazyme shall obtain sugars derived from lignocellulosic feedstocks to enable the work in Task 13 to commence immediately upon approval of Period 2.

Task 8: Submit reports

Solazyme shall submit financial reports, including standard and Recovery Act status reports, and technical progress reports. Reports will be provided in accordance with the Federal Assistance Reporting Checklist following the instructions included therein.

BUDGET PERIOD 2: CONSTRUCTION AND OPERATION

Task 9: Create and qualify pilot-scale SzIBR at manufacturing site

Solazyme shall install, startup, test and qualify at SzIBR all the necessary oil extraction and recovery equipment downstream of fermentation. Solazyme shall also conduct initial fermentation-only runs to verify operation of the pre-existing fermentation infrastructure at the project site, as well as complete process flow runs. Upon completion of this Task, the SzIBR facility will be fully operational and ready to conduct the major project campaigns specified in Task 10.

Task 10: Operate SzIBR to optimize and demonstrate integrated process

Solazyme shall conduct a series of major campaigns through the entire integrated process flow at SzIBR , collect extensive process data, and optimize the process parameters. The expected outcome is the demonstration of key performance parameters (KPPs) that Solazyme has specified. These KPPs correspond to process productivity, yield, and efficiency metrics required to reach commercial cost objectives (when the process is transferred to a commercial-scale facility).

Solazyme shall facilitate an Independent Engineer Performance Test. The expected outcome is completion of the IEPT tests demonstrating the KPPs while exceeding the minimum feedstock throughput requirements.

Task 11: Generate concentrated sugars derived from lignocellulosic feedstocks via enzymatic processes

Solazyme shall obtain sugar derived from lignocellulosic feedstocks from a subcontractor. The expected outcome is a quantity sufficient to conduct the work specified in Task 10 and Task 13.

Task 12: Generate concentrated sugars derived from lignocellulosic feedstocks via acid hydrolysis

Solazyme shall obtain sugar derived from lignocellulosic feedstocks from a subcontractor. The expected outcome is a quantity sufficient to conduct the work specified in Task 10 and Task 13.

Task 13: Optimize fermentation parameters at laboratory scale to support integrated pilot operations at SzIBR

Solazyme shall optimize the fermentation performance at laboratory scale in support of operations at SzIBR. The expected outcome is data that will guide pilot-scale operations.

Task 14: Refine algal oil from SzIBR to standard liquid transportation fuels

Solazyme will deliver the purified algal oil generated in Task 10 to subcontractors that will refine the oil to standard liquid transportation fuels, including biodiesel and renewable diesel. The expected outcome is liquid transportation fuels that fully comply with all applicable standards.

Task 15: Submit reports

Solazyme shall submit financial reports, including standard and Recovery Act status reports, annual reports and updated pro formas, as well as the Interim Final Technical Report, including property disposition and IP reports. Reports will be provided in accordance with the Federal Assistance Reporting Checklist following the instructions included therein.

BUDGET PERIOD 3: EXTENDED OPERATION

Task 16: Submit reports

Solazyme shall submit financial reports, the final pro forma, and the Final Technical Report, including final property disposition and final IP reports. Reports will be provided in accordance with the Federal Assistance Reporting Checklist following the instructions included therein.

PMC123.1 - Budget Justification for SF 424A Budget

Instructions and Summary

Award Number: DE-FOA-0000096
Award Recipient: UOP (sub-recipient)

Date of Submission: Resubmitted 9/28/09
Form submitted by: Solazyme
(May be award recipient or sub-recipient)

Please read the instructions on each page before starting.
If you have any questions, please ask your DOE contact. It will save you time!

On this form, provide detailed support for the estimated project costs identified on the SF-424A form (Budget).

- **The dollar amounts on this page must match the amounts on the associated SF-424A.**
- The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and a SF-424A form.
- The total budget presented on this form and on the SF424A must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.
- **For costs in each Object Class Category on the SF-424A, complete the corresponding worksheet on this form (tab at the bottom of the page).**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.**

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

CATEGORY	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Total Costs	Project Costs %	Comments (Add comments as needed)
a. Personnel						
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
Sub-recipient						
FFRDC						
Vendor						
Total Contractual						
g. Construction						
h. Other Direct Costs						
i. Indirect Charges						
Total Project Costs						

REDACTED
EXEMPTION 4

Additional Explanations/Comments (as necessary)

a. Personnel

PLEASE READ!!!

List costs solely for employees of the entity completing this form (award recipient or sub-recipient). All other personnel costs (of subrecipients or other contractual efforts of the entity preparing this) must be included under f., Contractual. This includes all consultants and FFRDCs.

Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the composite base pay rate, total direct personnel compensation and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			
1. Generation 2A Receiver Design													
EXAMPLE	Sr. Engineer												
ONLY!!!													
1. Green Diesel Production													
							REDACTED EXEMPTION 4						
2. (Task 2 Title)													
(Task 3 Title)													
	Total Personnel Costs												

Additional Explanations/Comments (as necessary)

b. Fringe Benefits

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:		REDACTED EXEMPTION 4		
Total fringe requested:				

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information, if it has not already been provided to the Contracting Officer, OR if it has changed since it was. Calculate the fringe rate and enter the total amount in Section B, line 6.b. ("Fringe Benefits") of form SF-424A.

x **A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the appliction of the approved rate, to arrive at the proposed fringes benefits dollars should also be provided.)

____ **There is not a current, federally approved rate agreement negotiated and available.**
(When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional explanation/comments (as necessary)

REDACTED
EXEMPTION 4

c. Travel

PLEASE READ!!!

Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.

All listed travel must be necessary for performance of the Statement of Projecct Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 1							
Domestic Travel							
EXAMPLE ONLY!!! Visit to PV cell mfr. to set up vendor agreement							
None							
			REDACTED EXEMPTION 4				
Domestic Travel subtotal							
International Travel							
International Travel subtotal							
Budget Period 1 Total							

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 2							
Domestic Travel							
Domestic Travel subtotal			REDACTED EXEMPTION 4				
International Travel							
International Travel subtotal							
Budget Period 2 Total							
Budget Period 3							
Domestic Travel							
Domestic Travel subtotal							
International Travel							
International Travel subtotal							
Budget Period 3 Total							
PROJECT TOTAL							

Additional Explanations/Comments (as necessary)

d. Equipment

PLEASE READ!!!

Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .

List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Thermal shock chamber					
None					
Budget Period 1 Total					
Budget Period 2					
Budget Period 2 Total					

REDACTED
EXEMPTION 4

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
				dget Period 3	
				REDACTED	
				EXEMPTION 4	
Budget Period 3 Total					
PROJECT TOTAL					

Additional Explanations/Comments (as necessary)

e. Supplies

PLEASE READ!!!

Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.

List all proposed supplies below, providing a bases of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Wireless DAS components					
None					
Budget Period 1 Total					
Budget Period 2					
Budget Period 2 Total					

REDACTED
EXEMPTION 4

REDACTED
EXEMPTION 4

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 3					
				REDACTED EXEMPTION 4	
Budget Period 3 Total					
PROJECT TOTAL					

Additional Explanations/Comments (as necessary)

f. Contractual

PLEASE READ!!!

The entity completing this form must provide all costs related to sub-recipients, vendors, contractors, consultants and FFRDC partners in the applicable boxes below.

Sub-recipients (partners, sub-awardees):

For each sub-recipient with total project costs of $100,000 or more, a separate SF-424A budget and PMC123.1 budget justification form must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipeint entries below.

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Vendors (includes contractors and consultants):

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Federal Research and Development Centers (FFRDCs):

For FFRDC partners, award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! XYZ Corp.					
	REDACTED EXEMPTION 4				

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
	REDACTED EXEMPTION 4				
	Sub-total				

Vendor Name/Organization	Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed)	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! ABC Corp.					
	REDACTED EXEMPTION 4				

FFRDC Name/Organization	Purpose	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
	REDACTED EXEMPTION 4				

Total Contractual		

AdditionalExplanations/Comments (as necessary)

g. Construction

PLEASE READ!!!

Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient to the award recipient should be entered under f. Contractual.

List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Overall description of construction actiivities:

xample Only!!! - Build wind turbine platform

General Description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Three days of excavation for platform site EXAMPLE ONLY!!!			
None			
		REDACTED EXEMPTION 4	
Budget Period 1 Total			
Budget Period 2			
		REDACTED EXEMPTION 4	
Budget Period 2 Total			

General Description	Cost	Basis of Cost	Justification of need
Budget Period 3			
		REDACTED EXEMPTION 4	
Budget Period 3 Total			
PROJECT TOTAL			

dditional Explanations/Comments (as necessary)

g. Construction

h. Other Direct Costs

PLEASE READ!!!

Other direct costs are direct cost items required for the project which do not fit clearly into other categories, and are not included in the indirect pool for which the indirect rate is being applied to this project. Examples are meeting costs, postage, couriers or express mail, telephone/fax costs, printing costs, etc.

Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General description	Cost	Basis of Cost	Justification of need
Budget Period 1			
XAMPLE ONLY!!! Grad student tuition			
			REDACTED EXEMPTION 4
Budget Period 1 Total			
Budget Period 2			
			REDACTED EXEMPTION 4
Budget Period 2 Total			
Budget Period 3			