

**U. S. DEPARTMENT OF ENERGY, OFFICE OF SCIENCE  
INTEGRATED SUPPORT CENTER—CHICAGO OFFICE**

**NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)  
ENVIRONMENTAL EVALUATION NOTIFICATION FORM**

**To be completed by "Applicant," i.e., organization with responsibilities for a "Federal action" involving application to DOE for a permit, license, exemption or allocation, or other similar actions. For assistance with this Form, refer to "Instructions for Preparing ISC-CH F-560, Environmental Evaluation Notification Form."**

Solicitation/Award No. (if applicable): DE-SC0019929

Organization Name: Catalytic and Redox Solutions LLC

Proposed Action Title: Low-Temperature Chemical Looping Reforming Catalysts for Small-Footprint GTL

Total DOE Funding/Total Funding: \$200,000 DOE/Total

**I. Project Description: (Use explanation pages if additional space is required)**

**A. Proposed Project/Action (if applicable, delineate Federally funded/Non-Federally funded portions)**

Mixed metal redox catalyst will be synthesized at the RI (NC State University). The catalyst may contain heavy metals. The catalyst precursors may include toxic chemicals including nitrate salts and heavy metal oxide.

The catalyst will be tested for the conversion of methane to CO and Hydrogen at the RI.

**B. Would the project proceed without Federal funding?**

Yes  No

***If "yes," use explanation page.***

**II. Description of Affected Environment: (Use explanation pages if additional space is required)**

**Catalyst synthesis:** Creation of up to 10 kg of mixed metal oxide catalyst that may contain heavy metals. All solid samples will be disposed of in compliance with NC State's existing permits. The emission of up to 100 g of NOx may result from synthesis procedures. This emission is in line with NC State's existing permits.

**Catalyst Testing:** Emission of up to 10 kg of methane, CO, and H2. This is consistent with the Universities existing permits. Generation of up to 1 L of hydrocarbon contaminated water, which will be collected stored and disposed of as hazardous waste in a manner consistent with the Universities existing permits.

III. Preliminary Questions:

- A. Is the DOE-funded work routinely administrative or *entirely* advisory or a "paper study?" Yes  No

***If "Yes", ensure that the description in Section I reflects this and go directly to Section V.***

- B. Is there any potential whatsoever for: (Provide an explanation for each "Yes" response)

- |     |   |                          |                                     |
|-----|---|--------------------------|-------------------------------------|
| 1.  | Work to be performed outdoors?  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2.  | Major modification of a building interior?  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3.  | Threat of violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health?        | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4.  | Siting, construction or major expansion of waste treatment, storage, or disposal facilities?                                | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5.  | Disturbance to hazardous substances, pollutants, or contaminants preexisting in the environment?                            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6.  | The presence of any environmentally-sensitive resources?  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 7.  | Any potential whatsoever for high consequence impacts to human health or the environment?                                   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 8.  | The work being connected to another existing/proposed activity that could potentially create a significant impact?          | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 9.  | Nearby past, present, and/or reasonably foreseeable future actions such that collectively significant impacts could result? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 10. | Scientific or public controversy, uncertainty over potential impacts, or conflicts regarding resource usage?                | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

***If "No" to ALL Section III.B. questions, go directly to Section V.***

IV. Potential Environmental Effects: (Provide an explanation for each "Yes" response)

- A. Environmentally Sensitive Resources: Could the proposed action potentially result in changes and/or disturbances to any of the following resources?

- |  | Yes                      | No                       |
|--|--------------------------|--------------------------|
| 1. Threatened/Endangered Species and/or Critical Habitats                          | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Other Protected Species (e.g., Burros, Migratory Birds, Pollinators)            | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Sensitive Environments (e.g., Tundra/Coral Reefs/Rain Forests)                  | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Cultural or Historic Resources  | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Important Farmland  | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Non-Attainment Areas for Ambient Air Quality Standards                          | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Class I Air Quality Control Region  | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Special Sources of Groundwater (e.g. Sole Source Aquifer)                       | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Navigable Air Space   | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Coastal Zones  | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Areas with Special National Designation (e.g. National Forests, Parks, Trails) | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Floodplains and/or Wetlands  | <input type="checkbox"/> | <input type="checkbox"/> |

- B. Regulated Substances/Activities: Would the proposed action involve any of the following regulated items or activities?

- |  |                          |                          |
|--|--------------------------|--------------------------|
| 13. Natural Resource Damage Assessments  | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Invasive Species or Exotic Organisms   | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Noxious Weeds  | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Clearing or Excavation greater than one acre or Removal of Trees Governed by Local Requirement | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Dredge or Fill (under Clean Water Act, Section 404, greater than one acre)                     | <input type="checkbox"/> | <input type="checkbox"/> |

B. Regulated Substances/Activities: Would the proposed action involve any of the following regulated Items or activities? (continued)

	Yes	No
18. Noise (in excess of regulations)	<input type="checkbox"/>	<input type="checkbox"/>
19. Asbestos Removal	<input type="checkbox"/>	<input type="checkbox"/>
20. Polychlorinated biphenyls (PCBs)	<input type="checkbox"/>	<input type="checkbox"/>
21. Import, Manufacture, or Processing of Toxic Substances	<input type="checkbox"/>	<input type="checkbox"/>
22. Chemical Storage/Use	<input type="checkbox"/>	<input type="checkbox"/>
23. Pesticide Use	<input type="checkbox"/>	<input type="checkbox"/>
24. Hazardous, Toxic, or Criteria Pollutant Air Emissions	<input type="checkbox"/>	<input type="checkbox"/>
25. Liquid Effluents	<input type="checkbox"/>	<input type="checkbox"/>
26. Spill Prevention/Surface Water Protection	<input type="checkbox"/>	<input type="checkbox"/>
27. Underground Injection	<input type="checkbox"/>	<input type="checkbox"/>
28. Hazardous Waste	<input type="checkbox"/>	<input type="checkbox"/>
29. Underground Storage Tanks	<input type="checkbox"/>	<input type="checkbox"/>
30. Radioactive or Radioactive Mixed Waste	<input type="checkbox"/>	<input type="checkbox"/>
31. Radiation Exposure	<input type="checkbox"/>	<input type="checkbox"/>
32. Nanoscale Materials	<input type="checkbox"/>	<input type="checkbox"/>
33. Genetically Engineered Microorganisms/Plants or Synthetic Biology	<input type="checkbox"/>	<input type="checkbox"/>
34. Ozone Depleting Substances	<input type="checkbox"/>	<input type="checkbox"/>
35. Greenhouse Gas Generation/Sustainability	<input type="checkbox"/>	<input type="checkbox"/>
36. Off-Road Vehicles	<input type="checkbox"/>	<input type="checkbox"/>
37. Biosafety Level 3-4 Laboratory	<input type="checkbox"/>	<input type="checkbox"/>
38. Research on Human Subjects or other Vertebrate Animals	<input type="checkbox"/>	<input type="checkbox"/>
39. Facility footprint exceeds 5,000 Square Feet	<input type="checkbox"/>	<input type="checkbox"/>


C. Other Relevant Information: Would the proposed action involve the following?

	Yes	No
40. Disproportionate Nearby Presence of Minority and/or Low Income Populations	<input type="checkbox"/>	<input type="checkbox"/>
41. Existing, Modified, or New Federal/State Permits	<input type="checkbox"/>	<input type="checkbox"/>
42. Involvement of Another Federal Agency (e.g. license/permit, funding, approval)	<input type="checkbox"/>	<input type="checkbox"/>
43. Action in a State with NEPA-type law	<input type="checkbox"/>	<input type="checkbox"/>
44. Expansion of Public Utilities/Services	<input type="checkbox"/>	<input type="checkbox"/>
45. Depletion of a Non-Renewable Resources	<input type="checkbox"/>	<input type="checkbox"/>
46. Subject to an Existing Institutional Work Planning and Control Process	<input type="checkbox"/>	<input type="checkbox"/>
47. Other Pertinent Information Which Could Impact Human Health or the Environment	<input type="checkbox"/>	<input type="checkbox"/>

V. Applicant certification that to the best of their knowledge all information provided on this form is accurate:

Does this disclosure contain: classified, sensitive business, or other exempt information that DOE would not be obligated to disclose pursuant to the Freedom of Information Act. Yes  No

A. Organization Official (Name and Title): Qingying Zha, Controller

Signature:  Date: 7/16/2019  
 e-mail: kelly.zha@catredox.com Phone: 919-757-9108

B. Optional Secondary Approval (Name and Title): Luke M. Neal, Chief Technology Officer

Signature:  Date: 7/17/2019  
 e-mail: redox@catredox.com Phone: 309-868-2234

Remainder to be completed by DOE

VI. DOE Concurrence/Recommendation/Determination:

A. DOE Project Director/Program Manager or Contract/Grant Management Specialist:

Has the Applicant completed this Form correctly?  
Does an existing generic categorical exclusion apply?

Yes  No

If yes, indicate:

Name and Title: Christine Grady Contract Specialist

Signature: Christine Grady Date: 7/17/19

B. DOE NEPA Team Review (if requested):

Is the class of action identified in the DOE NEPA Regulations (Appendices A-D to Subpart D (10 CFR § 1021))?

Yes  No

If yes, specify the class(es) of action: B3.6

Name and Title: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

C. DOE Counsel (if requested):

Name and Title: Peter Siebach

Signature: Peter Siebach Date: 7/18/2019

D. DOE NEPA Compliance Officer:

The preceding pages are a record of documentation required under DOE Final NEPA Regulation, 10 CFR § 1021.410.

- Action may be categorically excluded from further NEPA review. I have determined that the proposed action meets the requirements for Categorical Exclusion referenced above.
- Action requires approval by Head of the Field Organization. Recommend preparation of an Environmental Assessment.
- Action requires approval by Head of the Field Organization or a Secretarial Officer. Recommend preparation of an Environmental Impact Statement.

Comments/limitations if any: The attached disclosure from North Carolina State University is incorporated into this disclosure from Catalytic and Redox Solutions LLC, the determination applies to the entire proposed action.

NEPA Compliance Officer:

Name: Peter Siebach

Signature: Peter Siebach Date: 7/18/2019

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Solicitation/Award No. (if applicable): DE-SC0019929

Organization Name: North Carolina State University

Proposed Action Title: Low-Temperature Chemical Looping Reforming Catalysts for Small-Footprint GTL

Total DOE Funding/Total Funding: \$116,001

I. Project Description: *(Use explanation pages if additional space is required)*

A. Proposed Project/Action *(if applicable, delineate Federally funded/Non-Federally funded portions)*

Mixed metal redox catalyst will be synthesized. The catalyst may be contain heavy metals. The catalyst precursors may include toxic chemicals including nitrate salts and heavy metal oxide.

The catalyst will be tested for the conversion of methane to CO and Hydrogen.

B. Would the project proceed without Federal funding?

Yes  No

*If "yes," use explanation page.*

II. Description of Affected Environment: *(Use explanation pages if additional space is required)*

**Catalyst synthesis:** Creation of up to 10 kg of mixed metal oxide catalyst that may contain heavy metals. All solid samples will be disposed of in compliance with NC State's existing permits. The emission of up to 100 g of NOx may result from synthesis procedures. This emission is in line with NC State's existing permits.

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III. Preliminary Questions:

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*If "Yes", ensure that the description in Section I reflects this and go directly to Section V.*

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- |     |   |                          |                                     |
|-----|---|--------------------------|-------------------------------------|
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| 4.  | Siting, construction or major expansion of waste treatment, storage, or disposal facilities?                                | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5.  | Disturbance to hazardous substances, pollutants, or contaminants preexisting in the environment?                            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6.  | The presence of any environmentally-sensitive resources?  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 7.  | Any potential whatsoever for high consequence impacts to human health or the environment?                                   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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*If "No" to ALL Section III.B. questions, go directly to Section V.*

IV. Potential Environmental Effects: (Provide an explanation for each "Yes" response)

- A. Environmentally Sensitive Resources: Could the proposed action potentially result in changes and/or disturbances to any of the following resources?

- |  | Yes                      | No                                  |
|--|--------------------------|-------------------------------------|
| 1. Threatened/Endangered Species and/or Critical Habitats                          | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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| 5. Important Farmland  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6. Non-Attainment Areas for Ambient Air Quality Standards                          | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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- B. Regulated Substances/Activities: Would the proposed action involve any of the following regulated items or activities?

- |  |                          |                                     |
|--|--------------------------|-------------------------------------|
| 13. Natural Resource Damage Assessments  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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B. Regulated Substances/Activities: Would the proposed action involve any of the following regulated Items or activities? (continued)

	Yes	No
18. Noise (in excess of regulations)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
19. Asbestos Removal	<input type="checkbox"/>	<input checked="" type="checkbox"/>
20. Polychlorinated biphenyls (PCBs)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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23. Pesticide Use	<input type="checkbox"/>	<input checked="" type="checkbox"/>
24. Hazardous, Toxic, or Criteria Pollutant Air Emissions	<input type="checkbox"/>	<input checked="" type="checkbox"/>
25. Liquid Effluents	<input checked="" type="checkbox"/>	<input type="checkbox"/>
26. Spill Prevention/Surface Water Protection	<input type="checkbox"/>	<input checked="" type="checkbox"/>
27. Underground Injection	<input type="checkbox"/>	<input checked="" type="checkbox"/>
28. Hazardous Waste	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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32. Nanoscale Materials	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33. Genetically Engineered Microorganisms/Plants or Synthetic Biology	<input type="checkbox"/>	<input checked="" type="checkbox"/>
34. Ozone Depleting Substances	<input type="checkbox"/>	<input checked="" type="checkbox"/>
35. Greenhouse Gas Generation/Sustainability	<input type="checkbox"/>	<input checked="" type="checkbox"/>
36. Off-Road Vehicles	<input type="checkbox"/>	<input checked="" type="checkbox"/>
37. Biosafety Level 3-4 Laboratory	<input type="checkbox"/>	<input checked="" type="checkbox"/>
38. Research on Human Subjects or other Vertebrate Animals	<input type="checkbox"/>	<input checked="" type="checkbox"/>
39. Facility footprint exceeds 5,000 Square Feet	<input type="checkbox"/>	<input checked="" type="checkbox"/>

C. Other Relevant Information: Would the proposed action involve the following?

	Yes	No
40. Disproportionate Nearby Presence of Minority and/or Low Income Populations	<input type="checkbox"/>	<input checked="" type="checkbox"/>
41. Existing, Modified, or New Federal/State Permits	<input checked="" type="checkbox"/>	<input type="checkbox"/>
42. Involvement of Another Federal Agency (e.g. license/permit, funding, approval)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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44. Expansion of Public Utilities/Services	<input type="checkbox"/>	<input checked="" type="checkbox"/>
45. Depletion of a Non-Renewable Resources	<input type="checkbox"/>	<input checked="" type="checkbox"/>
46. Subject to an Existing Institutional Work Planning and Control Process	<input type="checkbox"/>	<input checked="" type="checkbox"/>
47. Other Pertinent Information Which Could Impact Human Health or the Environment	<input type="checkbox"/>	<input checked="" type="checkbox"/>

V. Applicant certification that to the best of their knowledge all information provided on this form is accurate:

Does this disclosure contain: classified, sensitive business, or other exempt information that DOE would not be obligated to disclose pursuant to the Freedom of Information Act. Yes  No

A. Organization Official (Name and Title): David Rainer, Assoc. Vice Chancellor of Env. Health & Public Safety

Signature:  Date: 7/12/2019  
 e-mail: sps@ncsu.edu Phone: 919-515-2444

B. Optional Secondary Approval (Name and Title): \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
 e-mail: \_\_\_\_\_ Phone: \_\_\_\_\_