Request for Proposals (RFP)

Technology Research, Development & Demonstration and Traditional Research & Development Projects to Sustain U.S. Manufacturing

REMADE-23-01

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Key Dates for Request for Proposals (RFP) REMADE-23-01	
Proposal Activity	**Key Dates***
Request for Proposals Released	February 23, 2023
RFP Information Session	February 27, 2023
Letters of Intent Due	March 27, 2023
Proposals Due	April 26, 2023
Proposal Teams Notified of Decision	June 2023
Anticipated Project Start Date	February 2024

*Due by 5:00 p.m. ET on the date listed.

RECORD OF CHANGE

Revision	Date	Sections	Description
1.0	February 23, 2023		Original Release

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1 Funding Opportunity Description

1.1 Background and Purpose

The REMADE Institute is a Manufacturing USA Institute focused on increasing the reuse, recycling, and remanufacturing of metals, fibers, polymers, and electronic scrap, thereby dramatically reducing the embodied energy and carbon emissions associated with industrial-scale materials production and processing. The Institute leverages up to $70 million in federal funding from the U.S. Department of Energy's Advanced Materials and Manufacturing Technologies Office (AMMTO) and $70 million in cost share from industry, consortium members, and other partners.

The **Mission** of the REMADE Institute is to enable applied research and development (R&D) of key industrial platform technologies that could dramatically reduce the embodied energy and carbon emissions associated with industrial-scale materials production and processing. In partnership with industry, academia, national laboratories, and trade associations, the REMADE Institute focuses on increasing the reuse, remanufacturing, recovery, and recycling (collectively referred to as Re-X) of metals, fibers, polymers, and electronic scrap (commonly referred to as *e-scrap*[1], *e-waste*, or *used electronics and electrical products*).

The **primary goals** of the REMADE Institute are to:

- Develop technologies capable of reducing energy and emissions through a reduction in primary material consumption and an increase in secondary feedstock use in energy-intensive industries;
- Develop technologies capable of achieving "better than cost and energy parity" for key secondary materials;
- Promote the widespread application of new enabling technologies across multiple industries; and
- Educate, train, and develop the incumbent and future workforce to support the deployment of REMADE technologies.

The REMADE Institute has structured its research agenda across five (5) **REMADE Nodes** that include the following core activities:

- Systems Analysis & Integration – Data collection, standardization, metrics, and tools for understanding how materials flow in the economy;
- Design for Re-X[2] – Development of design methodologies and tools to improve material utilization at end-of-life;

[1] Based on discussions with trade associations and industry subject-matter experts, the REMADE Institute has replaced the term *e-waste* with *e-scrap* throughout this document. Wherever the reader sees the term *e-scrap*, they should understand that it refers to what the REMADE Institute previously called *e-waste*.

[2] Re-X is shorthand for recovery, reuse, remanufacturing, and recycling. While not specifically called out in the above definition, sub-processes such as disassembly, sorting, inspection, cleaning, and collection should also be considered to fall within the scope of Re-X.

- Manufacturing Materials Optimization – Development of technologies to utilize secondary feedstocks, reuse scrap materials, and reduce in-process losses in manufacturing;
- Remanufacturing & End-of-life Reuse – Development of cost-effective technologies for cleaning, component restoration, condition assessment, and reverse logistics; and
- Recovery & Recycling – Develop technologies for rapid gathering, identification, sorting, separation, contaminant removal, cleaning, reprocessing, and reusing secondary materials.

This Node framework allows the REMADE Institute to address the cross-cutting challenges at each stage of the material life cycle for the four classes of materials relevant to its mission.

1.1.1 REMADE Institute Technology Portfolio

To date, the REMADE Institute has released five (5) requests for proposals (RFPs) and has either funded or selected for negotiation a total of eighty-two (82) projects[3] in furtherance of its goals. Twenty (20) projects, deemed Exploratory, provided seed funding to demonstrate proof-of-concept or reduce the uncertainty associated with high-risk/high-reward technical approaches.

The REMADE Institute has also funded fifty-six (56) Full or Traditional[4] research and development (R&D) projects. These projects focus on developing tools and technologies consistent with the REMADE Roadmap priorities, complementary to the R&D portfolio, and capable of enabling the REMADE Institute to achieve its goals. Although the expectation was that these projects would culminate in the **validation**[5] of the technology (see Figure 1) by the project's end, a recent review of the REMADE Institute technology portfolio revealed that most of the Full and Traditional RD&D projects would **demonstrate** the technology by the project's end.

Finally, the REMADE Institute has funded three (3) Transformational RD&D projects targeting the recycling or remanufacturing industries. Unlike Traditional RD&D projects, which focus on a single technical or economic barrier, Transformational RD&D projects address aspects of several nodes and do not align with a single node. They also consider multiple segments of the material supply chain and clearly explain how the technology solution will be integrated into the manufacturing or remanufacturing supply chain. The primary distinction between Traditional and Transformational RD&D projects is the requirement that Transformational RD&D projects **demonstrate** that the technology solution will produce secondary feedstocks that manufacturers or remanufacturers can use, making the scope of Transformational RD&D projects much broader.

Exploratory, Traditional, and Transformational RD&D projects represent a progression in the expected technology maturity, also referred to as the Technology Readiness Levels or TRLs,

[3] Three of these projects are Education and Workforce Development (EWD) projects.

[4] The term "Full RD&D project" was used for RFPs 1-3 but was replaced by the term "Traditional RD&D project" for RFPs 4-5 to differentiate from Transformational RD&D projects.

[5] Figure 1 shows two mechanisms for **validating** the technology (bench-scale lab trials (TRL 4) or process or equipment validation trials (TRL 5)), and two mechanisms for **demonstrating** the technology (prototype equipment or process testing (TRL 6) or system prototype demonstration (TRL 7)).

achieved by the end of each type of project. For example, exploratory projects focused on **proof-of-concept** (TRL 3) or risk-reduction activities. By contrast, the REMADE Institute expects that Full and Traditional RD&D projects will **validate** (TRL 4-5) the technology by the project's end; however, as noted earlier, most of the Full and Traditional R&D projects will **demonstrate** (denoting TRL 6-7) the technology by the project's end. As noted above, Transformational RD&D projects **must demonstrate** that the technology solution will produce secondary feedstocks manufacturers can use.

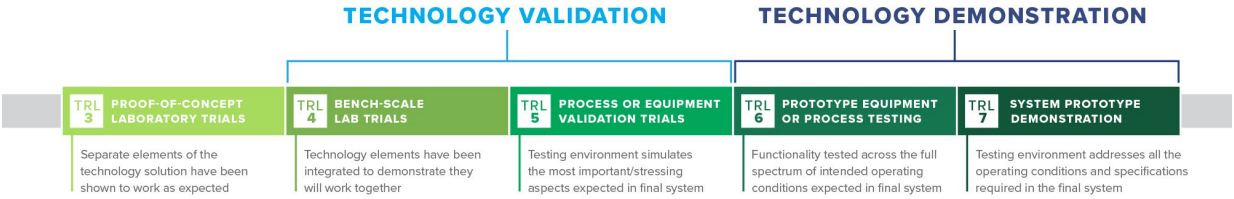

Figure 1. Description of Activities Associated with Technology Readiness Levels (TRLs) 3-7

1.1.2 Purpose of this RFP

This RFP solicits proposals to develop and mature tools and technologies consistent with the REMADE Institute's goals to reduce energy and emissions, achieve "better than cost and energy parity," and promote the widespread application of new enabling technologies across multiple industries. To ensure proposals deliver relevant solutions that will motivate the subsequent industry investments, they must be consistent with the specific requirements of this RFP, align with the research agenda in the REMADE Institute Technology Roadmap, and complement the current R&D portfolio.

1.2 Proposals Sought

This RFP solicits proposals for projects in two Areas of Interest (AOIs):

A. Technology Research, Development & Demonstration (RD&D) Projects
B. Traditional Research and Development (R&D) Projects

Appendices B and C provide additional details regarding proposals the REMADE Institute seeks for these AOIs.

1.2.1 Technology RD&D Projects

This RFP solicits proposals for Technology RD&D project proposals focused on ***developing and demonstrating (TRL 6-7) tools and technologies*** consistent with the REMADE Institute's goals to reduce energy and emissions, achieve "better than cost and energy parity," and promote the widespread application of new enabling technologies across multiple industries. By the end of these projects, respondents must conduct technology demonstrations in "relevant[6]" (TRL 6) or

[6] A relevant environment is a testing environment that simulates both the most important and most stressing aspects of the operational environment.

"operational[7]" (TRL 7) environments, which the REMADE Institute anticipates will motivate the industry investments required to complete technology development and deploy these technologies across the U.S. manufacturing ecosystem. The REMADE Institute will consider proposals that involve tools and technologies developed as part of prior REMADE Institute-funded projects or independently of REMADE Institute funding.

The defining requirements of Technology RD&D projects are as follows:

- Technology RD&D projects must support the mission of the REMADE Institute, enable the Institute to achieve its stated goals, and impact the REMADE Technical Performance Metrics (TPMs) listed in Appendix A.
- Technology RD&D projects **must demonstrate the tools and technology in a relevant (TRL 6) or operational (TRL 7) environment** by the end of the project. Proposals that do not propose to reach TRL 6 or TRL 7 will be considered non-responsive to this RFP AOI.
- Technology RD&D projects align to a single REMADE Node; however, projects that align to multiple nodes are also allowed.
- Technology RD&D projects must describe how the technology solution will be integrated into existing supply chains and articulate a clear path to transition the tools and technologies to the marketplace.
- **Technology RD&D projects must include at least one industry partner who actively guides the project.** Although the REMADE Institute prefers industry-led projects, **qualified organizations, including academia and national laboratories, can lead Technology RD&D Projects subject to this requirement**. Trade associations are not eligible to lead Technology RD&D projects.

The primary distinction between Technology RD&D and Traditional R&D is that Technology RD&D projects **must demonstrate the tools and technology in a relevant (TRL 6) or operational (TRL 7) environment** by the end of the project. By contrast, Traditional R&D projects need only **validate** the technology by the project's end. Consistent with a number of the Traditional R&D projects the REMADE Institute previously selected, the REMADE Institute will accept Traditional R&D projects that propose to **demonstrate the tools and technology** (TRLs 6-7) by the project's end. The REMADE Institute will view these projects more favorably than Traditional R&D projects that validate the technology by the project's end.

1.2.2 Traditional R&D Projects

This RFP solicits Traditional R&D project proposals to develop tools and technologies consistent with the research priorities in the REMADE Technology Roadmap, complement the current R&D portfolio, and enable the REMADE Institute to achieve its goals and TPMs. Traditional R&D projects align with one of the five REMADE Nodes. **Any qualified organization, including industry, academia, or national laboratories, can lead traditional R&D projects; however, trade associations are not eligible to lead Traditional R&D proposals.** The REMADE Institute encourages every project team to include an industry partner who can actively guide the project.

[7] An operational environment addresses all the operational requirements and specifications required of the final system, including platform/packaging.

1.3 Topic Areas

The REMADE Institute has identified six (6) Topic Areas, identified below, for the two AOIs in this RFP. In addition, Appendices B and C provide additional details regarding project proposals the REMADE Institute is seeking for these AOIs.

1.3.1 Technology RD&D Projects

The REMADE Institute seeks project proposals to **develop and demonstrate REMADE-relevant tools and technology** by the end of the project. The primary difference between the two topics listed below is whether proposal teams originally developed the tools and technologies as part of prior REMADE Institute-funded projects (Topic A1) or independently of REMADE Institute funding (Topic A2).

- Topic A1: Technology RD&D Projects to Demonstrate Tools and Technologies Developed as Part of Prior REMADE Institute-funded Projects
- Topic A2: Technology RD&D Projects to Demonstrate Tools and Technologies Developed Independently of REMADE Institute Funding

To avoid duplication of prior REMADE Institute-funded projects, teams interested in proposing against Topic A2 are encouraged to review the current project portfolio. In addition, Appendix D contains a list of projects the REMADE Institute has funded, organized by node and material class.

1.3.2 Traditional R&D Projects

- The REMADE Institute seeks proposals for Traditional R&D projects that align with the four (4) topics below. To develop these topics, the REMADE Institute followed a three-step process. First, the Technical Leadership Committee (TLC) compiled a list of new research activities incorporated in the recently updated REMADE Technology Roadmap and new topics identified through the REMADE Institute Request for Information (21-02-RFI) released in the spring of 2022. Second, the REMADE Institute identified five (5) topics from the prior RFP for which it did not fund projects[8]. Third, the REMADE Institute integrated the information gathered from the first two steps to create the four (4) Topic Areas listed below and described in Appendix C.

- Topic B1: Systems Analysis & Integration – Material Flow, Life Cycle Analysis, Systems Analysis, and Techno-economic Analysis Models, Tools, and Data
- Topic B2: Manufacturing Materials Optimization – Manufacturing Processes and Qualification Methods that Enable Greater Use of Cost-Competitive Secondary Feedstocks, Including Cross-Industry Feedstocks
- Topic B3: Remanufacturing & End-of-life Reuse – Cost-effective and Energy-Efficient Technologies for Disassembly, Cleaning, Restoration, and Condition Assessment to Increase Remanufacturing and Reuse at End-of-life

[8] For this RFP, REMADE-22-02, the REMADE Institute eliminated two of the five topics based on a lack of response to this topic for the two prior RFPs, REMADE-20-01 and REMADE-21-01. The REMADE Institute modified the three remaining topics using the feedback the REMADE Institute received during the second step.

- Topic B4: Recycling & Recovery – Technologies to Rapidly and Efficiently Collect, Characterize, Sort, Separate, and Decontaminate Recovered Waste Streams and Produce Cost-competitive Secondary Feedstocks, Including Cross-Industry Feedstocks

1.3.3 Topics for which the REMADE Institute Is Not Accepting Proposals (Non-responsive Topics)

The REMADE Institute is not soliciting proposals for projects that address the topics listed below. The REMADE Institute will consider proposals submitted for these topics to be non-responsive and will not review them.

- Projects that address material classes other than metals, polymers, fibers, or e-scrap;
- Projects that address legal, regulatory, or institutional[9] barriers;
- Projects that address consumer education or behavior to increase or change materials collection and recycling;
- Projects focused solely on demonstrating the application of commercial or near-commercial technology (i.e., requiring no additional technology development);
- Projects seeking funds to acquire, install, start, or operate commercial or near-commercial technology to the benefit of a specific company;
- Processes or technology solutions focused on recovering and recycling "critical and near-critical materials" such as dysprosium, terbium, europium, neodymium, yttrium, lithium, and tellurium;
- Processes or technology solutions for recovering and recycling EV batteries and battery materials (NOTE: proposals addressing battery remanufacturing, repurposing, reuse, repair, or technology for condition assessment and refurbishment of batteries are in scope);
- Processes to produce solid fuels (e.g., pellets) from polymers or fibers;
- Projects involving incineration of solid waste, with or without energy recovery;
- Recovery of precious metals from e-scrap or other metal waste streams;
- Projects related to tire recycling or remanufacturing;
- Projects that propose the use of polymers, glass, or metal powders as asphalt modifiers;
- Projects focused on the recovery and recycling of building materials and construction and demolition wastes (CDW);
- Projects targeting the recovery and recycling of additive manufacturing feedstocks; and
- Projects related to composites recycling.

[9] Institutional barriers would include factors such as access to curbside recycling or single versus dual-stream recycling.

2 Award Information

2.1 Anticipated Funding

Table 1 displays the total investment available for funding selected projects in response to this RFP, which will be approximately $10 million in REMADE Institute funding and require 1:1 cost share from project teams.

Table 1: Allocation of Funding for RFP REMADE-23-01

AOI Topic Areas	REMADE Funding Allocation ($K)	Maximum REMADE Funding per Project ($K)
Technology RD&D (Topics A1-2) & Traditional RD&D (Topics B1-B4) Projects	10,000	1,500

The final allocation of REMADE Institute funding between Technology RD&D and Traditional R&D Projects will depend on the number and quality of proposals received; however, the REMADE Institute will prioritize the selection of Technology RD&D projects. The REMADE Institute reserves the right to fund any proposal in whole or part, request additional information to assist in the review process, and reject any or all proposals. Awards are subject to funding availability. The REMADE Institute is not obligated to make any awards under this RFP, and the REMADE Institute will administer all funds awarded under this RFP.[10]

2.2 Period of Performance

Technology RD&D and Traditional R&D projects can have a performance period of up to 24 months. The REMADE Institute will manage each project through a stage-gate process and release funding by budget period (typically 12 months). Proposals selected for an award will be required to submit an updated Statement of Project Objectives (SOPO) and detailed budget for REMADE Institute and DOE-AMMTO review and approval.

2.3 Proposals from Organizations with Active REMADE Projects are Welcome

The REMADE Institute will accept proposals from project teams with active projects that want to expand the scope of their current projects to include a technology demonstration component. To be eligible, teams must meet two conditions. First, the project work scope in their current SOPO must not include technology demonstration activities. Second, they must have passed their Go/No-Go decision point or be on track to complete their Go/No-Go decision point by March 31, 2023. Principal Investigators (PIs) who are uncertain whether their current REMADE project includes a technology demonstration component should discuss this with their project manager.

[10] If a DOE Lab is selected for award, the funding would be administered directly from DOE-AMMTO through an Annual Operating Plan (AOP).

3 Eligibility

3.1 Eligible Applicants

3.1.1 REMADE Membership requirements

Applicants to this RFP do not need to be members of the REMADE Institute when they submit their proposals. Proposals from non-members are welcome***; however, the project team members for proposals selected for negotiation must become REMADE Institute members by the date the subaward becomes effective.*** As shown in Figure 2, the subaward effective date is when the DOE incorporates the project into the Cooperative Agreement between the DOE and the Sustainable Manufacturing Innovation Alliance Corp. (SMIA). This requirement applies to all organizations providing matching cost share towards the project or receiving federal funding through the REMADE Institute; however, it does not apply to vendors or service providers providing goods and services as a part of their normal business operations. To be eligible for access to federal funding, organizations must join the REMADE Institute as either a Tier 1 or Tier 2 industry member or as an academic member (in the case of colleges and universities).

Foreign entities, including U.S. operations with a foreign parent company, may participate in REMADE projects; however, their participation is subject to approval by the DOE. Therefore, any foreign entity interested in this RFP should contact the REMADE Institute as soon as possible.

For additional information regarding membership and foreign entity participation, contact John Kreckel, Director of Membership and Workforce Development, at jkreckel@remadeinstitute.org.

3.1.2 Mandatory Letter of Intent (LOI)

To be eligible to submit a proposal, proposal teams must first have submitted an LOI. Any qualified industry, academia, or national laboratory organization can submit an LOI for a Technology RD&D or Traditional R&D project. However, since trade associations are not eligible to lead projects, they are not eligible to submit an LOI.

3.1.3 Teaming

Prior experience has shown successful projects include collaborations among industry, academia, national laboratories, industry consortia, and other stakeholders.

Figure 2 Process and Timeline for Proposal Submission & Review and Project Negotiation After Proposal Selection

The REMADE Institute encourages teaming, a consideration used when evaluating the proposal team's capability to successfully execute the project and meet the desired objectives of the project. To facilitate teaming, the REMADE Institute will be scheduling two virtual teaming

sessions on **March 8 and March 9, 2023**.[11] At these sessions, potential proposers can introduce themselves, describe their technical expertise and capabilities, and identify the skill sets their proposal team may be seeking. In addition, the REMADE Institute will post recordings of the information sessions on its website for those unable to attend. Proposers can find additional details on the REMADE Institute Project Call website.

Technology RD&D project teams must include at least one industry partner and are encouraged to include additional industry partners. In addition, project teams can include national laboratory, university, and trade association participants. The project team's composition should reflect the competencies required to ensure a successful technology demonstration by the project's end.

3.2 Cost-Sharing

All projects require a minimum 1:1 cost share (i.e., proposal teams must match every dollar of REMADE Institute funding with at least one dollar of cost share). Project teams may provide cash or in-kind cost share but must incur the cost share within the applicable budget period in the Period of Performance. All cost share must be allowable per the REMADE Institute Cooperative Agreement and the Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (2 CFR 200 et seq.) as amended by 2 CFR 910. Specific sections regarding cost share include, but are not limited to, 2 CFR 200.306, 2 CFR 910.130, 2 CFR 910.352, and 2 CFR 200 Subpart E – Cost Principles.

The Lead Organization or any team member may commit cost share. However, the Lead Organization is ultimately responsible for ensuring that its project team meets or exceeds the 1:1 cost share requirement and all proposed cost share and reporting requirements for each invoice it submits to the REMADE Institute.

Proposal teams must include cost-share commitment letters with their proposal package that collectively provide the required cost share for their project. The cost share commitment letters may not contain contingencies.

Applicants are responsible for the costs incurred to develop their response to this RFP. These costs are not eligible for reimbursement (or allowable as cost-share) under an award.

3.3 Compliance Criteria

The REMADE Institute reviews each applicant's submission at each phase of the proposal process to determine whether it meets the eligibility requirements outlined in Section 3.1 of this RFP.

The REMADE Institute considers proposals that do not meet the compliance criteria listed below to be non-compliant. The REMADE Institute will not review non-compliant submissions.

The REMADE Institute will deem Letters of Intent (LOIs) and proposals submitted through means other than REMADE@remadeinstitute.org, LOIs submitted after the applicable deadline, or incomplete LOIs as non-compliant.

[11] Depending on the level of interest, REMADE may also hold an additional teaming session.

3.3.1 Letters of Intent (LOI)

The REMADE Institute will consider Letters of Intent compliant if:

- The LOI complies with the content and form requirements in the LOI Template posted on the REMADE Institute Project Call Website,
- The proposal team meets the eligibility requirements outlined in Section 3.1,
- Technology RD&D proposal teams include at least one industry partner, and
- The applicant has submitted all the required documents electronically to REMADE@remadeinstitute.org by **5:00 p.m. ET, March 27, 2023**.Technology RD&D and Traditional R&D Proposals

The REMADE Institute will consider Technology RD&D and Traditional R&D Proposals as compliant if:

- The applicant has submitted a compliant LOI,
- The proposal team meets the eligibility requirements outlined in Section 3.1,
- The proposal meets the cost-sharing requirements outlined in Section 3.2,
- The proposal includes cost-share commitment letters that collectively commit to providing the required cost share for the proposed project,
- The proposal complies with the content and form requirements in the RFP Template posted on the Project Call Website, and
- The applicant has submitted all the required documents electronically to REMADE@remadeinstitute.org by **5:00 p.m. ET, April 26, 2023**.

4 Application Submission Information

4.1 Application Submission Process

The REMADE Institute intends to utilize a two-step process for this RFP that involves the submission of a Letter of Intent (LOI) and a proposal.

The first step involves the submission of an LOI that identifies the topic of the proposal, the proposed team members, and (for Technology RD&D Projects) whether they developed the project concept they are presenting as part of a prior REMADE Institute-funded project or independent of REMADE Institute funding. Based on the LOIs, the REMADE Institute gets an indication of how many proposals to expect and can begin to identify appropriate proposal reviewers consistent with the REMADE Institute's conflicts of interest (COI) policy. **Only applicants who have submitted a Letter of intent will be eligible to submit a proposal.**

The second step in the application process involves the submission of a proposal which includes a 5-page Concept Paper, a PowerPoint presentation, a Statement of Project Objectives (SOPO), an IP Management Plan, and a budget. Templates for these documents are included in the RFP Package. All proposal teams submitting an LOI are eligible to submit a proposal unless a team receives a notification indicating its submission was non-compliant (see Section 3.3.1).

The REMADE Institute will not review or consider proposals submitted through means other than REMADE@remadeinstitute.org, proposals submitted after the applicable deadline, or incomplete proposal packages.

4.1.1 Letter of Intent Submission Process

Proposers must submit an LOI that meets the compliance requirements in Section 3.3.1 of this RFP to REMADE@remadeinstitute.org. Organizations submitting LOIs for Technology RD&D or Traditional R&D Project proposals should use the designation "LOI-REMADE-23-01-<Lead Organization>-Proposal Title" in the email's subject line.

Proposal teams must submit their LOI using the form and following the requirements outlined in the LOI Template posted on the REMADE Institute Project Call Website.

If you are considering responding to this RFP, the REMADE Institute encourages you to submit an LOI regardless of the maturity of your project concept. While submitting an LOI does not obligate a prospective Lead Organization to submit a proposal, the REMADE Institute will only review a proposal if the proposal team first submitted an LOI by the LOI deadline.

Because there are circumstances where the proposal team members may change after submitting an LOI, proposal teams can add or subtract proposal team members after submitting their LOI.

4.1.2 Proposal Submission Process

Proposers must submit a proposal package that meets the compliance requirements in Section 3.3.2 to REMADE@remadeinstitute.org. Please include the following designations in the subject line of the email:

- Technology RD&D: "Technology-REMADE-23-01-<Lead Organization>-Proposal Title"
- Traditional R&D: "Tradition-REMADE-23-01-<Lead Organization>-Proposal Title"

Proposal teams must submit their proposal using the Concept Paper Template and the RFP REMADE-23-01 PowerPoint Template available on the Project Call website. The REMADE Institute requires proposal teams to use these Templates.

4.2 Formatting of the Letter of Intent and Proposal

4.2.1 Letters of Intent

Proposal teams must submit their LOI using the LOI Template available on the REMADE Institute Project Call website.

4.2.2 Technology RD&D and Traditional R&D Proposals

Teams must submit their proposals using the Concept Paper Template and the RFP REMADE-23-01 PowerPoint Template available on the REMADE Institute Project Call website.

There is a 5-page limit for Technology RD&D and Traditional R&D Concept Papers, excluding the title page and any required appendices. The REMADE Institute will not consider pages exceeding this limit. Proposals should retain the formatting in the Concept Paper Template (single-spaced, U.S. Letter (8.5 by 11 inches) with 1" margins on all sides). All text must be Arial, Calibri, or Times

New Roman type and no smaller than 11-point font; however, captions, figures, tables, etc., may use 10-point font.

Similarly, there is a 16-slide limit (excluding the backup slides) for the PowerPoint Presentations that proposal teams must submit along with the Concept Paper, SOPO, an IP Management Plan, and Cost Volume. The PowerPoint Presentation Template is available in the RFP Packagehttps://remadeinstitute.org/rfp-23-01.

4.3 Submission Deadlines

4.3.1 Letters of Intent

Each proposal team must submit its LOI by 5:00 p.m. ET**, March 27, 2023**. The REMADE Institute will not accept late submissions. Therefore, the REMADE Institute strongly encourages teams to submit their LOIs as early as practicable to determine eligibility for proposal submission or allow adequate time for LOI resubmittal if desired.

The REMADE Institute will email applicants confirming it has received their LOI.

4.3.2 Proposals

Each proposal team must submit its Concept Paper, PowerPoint Presentation, Statement of Project Objectives (SOPO), IP Management Plan, and budget (using the Budget Justification Excel Template in the RFP Package) by **5:00 p.m. ET on April 26, 2023.**

The REMADE Institute will email applicants to confirm receipt of their proposal but will not review late submissions.

4.4 Questions and Answers (Q&A)

The REMADE Institute will hold an information session for this RFP on February 27, 2023. Please refer to the Project Call website for additional information session details. Following this session, the REMADE Institute will post a video of this event on the Project Call website for those unable to attend.

The REMADE Institute will compile the questions it receives and the corresponding answers into a Frequently Asked Questions (FAQ) document, which it will post on the REMADE Institute Project Call website. In addition, this Project FAQ will include responses to questions the REMADE Institute did not have time to answer thoroughly during the information session.

Proposers with questions regarding this RFP that arise during the preparation of LOIs or Proposals should submit their questions to REMADE_RFP@remadeinstitute.org with the subject line: "REMADE-23-01 Q&A". The REMADE Institute will answer these questions directly and will append them to the Project FAQ on the REMADE Institute Project Call website.

5 Application Review Information

5.1 Technical Evaluation Criteria

5.1.1 Letters of Intent

The first step of the proposal process is submitting a Letter of Intent. The **REMADE Institute will not evaluate these LOIs for alignment with this RFP.** As detailed in section 4.1.1, submitting an LOI does not obligate a prospective Lead Organization to submit a proposal. Letters of Intent are non-binding concerning the team members and proposal title.

5.1.2 Technology RD&D and Traditional R&D Proposals

The four (4) criteria for evaluating Technology RD&D and Traditional R&D Proposals are as follows:

Technical Merit – the extent to which the project, if successfully conducted, will materially advance the mission of the Institute to develop key industrial platform technologies that decrease primary feedstock consumption, increase secondary feedstock consumption, and reduce embodied energy and carbon emissions.

Technical Approach – the extent to which the applicant's approach addresses the technical and economic challenges and other barriers to successfully achieving the project objectives and executing a **technology demonstration by the end of the project**.

REMADE Impact and Commercialization Potential – the extent to which the project will help the REMADE Institute achieve the TPMs, will result in a technology demonstration that will lead to subsequent adoption by U.S. manufacturers, and articulates a clear path to transition the proposed technology to U.S. manufacturers.

Team and Management Capabilities – the likelihood that the technical team will be able to execute the project within the proposed budget and performance period they have outlined, given their experience, expertise, past accomplishments, available resources, institutional commitment, and access to the relevant technologies that are critical to the success of the proposed technology demonstration.

Table 2 contains the rubric merit reviewers will use to evaluate Technology RD&D and Traditional R&D Proposals. The REMADE Institute has identified the applicable list of factors for each criterion. Blue text in Table 2 only applies to Technology RD&D proposals.

Appendix A lists the REMADE Institute Technical Performance Metrics (TPMs).

5.1.3 Weighting Factors for Technology RD&D and Traditional R&D Projects

Table 3 provides the weighting factors for the four criteria in Section 5.1.2.

5.2 Merit Review Process for Technology RD&D and Traditional R&D Proposals

Individual merit review panels aligned to the REMADE material classes will conduct the proposal evaluation process for Technology RD&D proposals. Similarly, individual merit review panels aligned to the REMADE Nodes will evaluate the proposal for Traditional R&D projects. The

REMADE Institute will assign a chairperson to lead the review process for each node. The REMADE Institute will form these panels from the Technical Advisory Committee (TAC), REMADE membership, and other DOE or external subject matter experts (SMEs).

The merit review process for Technology RD&D and Traditional R&D proposals consists of the following steps:

- *Proposal Evaluation* – Merit review panelists will review the proposals assigned using the criteria outlined in Table 2. Each reviewer will be allowed to identify questions they want the proposal teams to cover during their oral presentation. Before the oral presentation, the REMADE Institute will compile these questions and provide them to each merit review panelist and proposal team to allow the proposal teams time to prepare answers.
- *Oral Presentation and Development of Recommendations* – Once merit review panelists have finished reviewing proposals and developing questions, the merit review panels will convene. The proposal teams assigned to each panel will give a 30-minute oral presentation consisting of a 20-minute presentation and 10 minutes of Q&A. During their presentations, proposal teams will answer the questions that merit review panelists identified. **Following the oral presentations, the merit review panels will discuss each proposal and develop funding recommendations for the proposals assigned to them.** Finally, they will present their recommendations to the REMADE Institute CTO, Technical Leadership Committee (TLC), and the REMADE Institute Project Managers.
- *Development of Funding Recommendations for the Governance Board (GB)* – In consultation with the TLC and REMADE Institute Program Managers and subject to COI Policy, the CTO will review the final list of projects recommended by the merit review panels for submittal to the GB and the DOE for award negotiations. The TLC will then develop funding recommendations for the GB by prioritizing the list of proposals recommended by the merit review panels based on factors such as (but not limited to) (a) available REMADE Institute funds, (b) funding allocation as specified in this RFP, (c) the potential impact of each project and its ability to help the REMADE Institute achieve its goals and TPMs, and (d) whether a PI is leading multiple projects recommended for funding.
- *Final Approval of REMADE Recommended Projects* – Once the TLC has developed a portfolio of projects to recommend to the GB, the CTO and the CEO will present the outcome of the merit review process and projects the TLC recommended for funding to the GB for their approval. The GB reviews and then approves or rejects these recommendations.
- *DOE Approval* – As part of its substantial involvement, the DOE must approve all REMADE projects, including projects selected from this RFP.

Table 2. Evaluation Criteria for Traditional R&D and Technology RD&D Proposals*

	Description	Excellent (E)
Technical Merit	• **Proposal Aligned w/RFP, the Tech Roadmap, material class, & TPMs** • **Tech/Econ Barriers** • **Project Goals, Objectives, & Deliverables** • **Level of Technology Innovation**	• Well aligned to the RFP, Tech Roadmap, material class and TPMs • Clearly identified and addressed in the proposal • Fully identified. Quantified expected improvement • Incorporates technology innovations
Technical Approach	• **Technical Approach** • **Key Technical Elements and Associated Tasks** • **Primary reasons Technical Approach will work** • **Research Methods & Analysis Techniques** • **Expected Results/Deliverables & Format** • **Preliminary SOPO** • **Division of Labor across Team** • **Milestones and Go/No-Go Decision Points** • **Plan to Test/Validate Solution (Traditional R&D Projects)** • **Plan to Test/Demonstrate Solution (Technical RD&D Projects)**	• Highly innovative, addresses tech/econ barriers, likely to solve the problem • Well developed & integrated/credible • Clearly explained • High degree of novelty and originality • Clearly defined • Reflects workscope and is credible • Appropriately divided/task owners ID'd • Included & aligned w/SOPO • Project includes technology validation activities, which are fully described. • **Project includes technology demonstration activities, which are fully described.**
REMADE Impact & Commercialization Potential	• **Technology Demonstration (Technology RD&D Projects)** • **Likelihood to Promote Industry Adoption** • **Technology Transition Strategy** • **TPM Impacts** • **Performance level vs industry requirements** • **Technology/Market Improvements** • **Potential End-users** • **Adoption Risks/Barriers & Tech Challenges** • **Timeline**	• **Project includes a tech demo that is conducted in a "relevant" (TRL 6) or operational (TRL 7) environment by the end of the project.** • Industry confirms the tech demo is thorough enough to promote industry adoption. No other demo is required. • Team has described how the tech solution will be integrated into existing supply chains and articulated a clear path to transition the tools/tech to the marketplace. • TPMs impacts have been quantified & are significant • Exceeds industry requirements • Quantified concerning the performance/$$ impact • Listed – at least one is a Team Member • Listed & plan to address them given • Associated timeline for tech transition laid out
Team & Management Capabilities	• **Lead Organization** • **Project Team Composition** • **Project Team Composition (Technology RD&D Projects)** • **Project Team Members' Experience/Expertise** • **Project Schedule** • **Level of Effort Being Proposed/Project Costs** • **Project Team Member involvement/Cost Share** • **Relevant Facilities/Equipment/Other Resources** • **Technology Demonstration (Technology RD&D Projects)** • **Technology Demonstration Facilities (Technology RD&D Projects)**	• Lead Org and PI have required technical expertise to lead the project successfully. • Industry & non-industry participation. Industry is leading the project. • **Project team includes at least one industry partner who actively guides project.** • Team Members have direct experience with the technology & sufficient expertise to perform the project. • Schedule is realistic for the SOW and aligns with the SOPO • Costs reasonable for SOW and sufficient to carry out the work • Actively support project & provide cost share, **Industry provides 50% cost share** • Team has required access to appropriate facilities, equipment, and other resources • **Team has demonstrated competency for technology areas relevant to tech demo.** • **Team has access to tech demo facilities, which have been clearly described.**

*** Evaluation Criteria in blue text are only relevant to Technology RD&D Proposals and should not be used to evaluate Traditional R&D Proposals.**

Table 3. Weighting Factors for Criteria for Technology RD&D & Traditional R&D Projects

Evaluation Criteria	Weighting Factors for Evaluation Criteria	
	Technology RD&D Projects	Traditional R&D Projects
Technical Merit	20%	25%
Technical Approach	30%	25%
REMADE Impact & Commercialization Potential	30%	25%
Team & Management Capabilities	20%	25%

6 Post-Selection Information

6.1 Incorporation of the Projects into the REMADE Institute's Cooperative Agreement

After selection, the REMADE Institute must formally incorporate all projects into the Cooperative Agreement between the DOE and the Sustainable Manufacturing Innovation Alliance Corp. (SMIA) via an award modification approved and issued by the DOE Contracting Officer before the REMADE Institute can grant a subaward to the project team.

The REMADE Institute will execute subawards, referred to as Technical Project Agreements, with the Lead Organization. All terms and conditions of the Cooperative Agreement with the DOE that apply to the REMADE Institute also apply to the Technical Project Agreement for the Lead Organization and subaward participants except as otherwise expressly provided.

6.2 Technical Performance Monitoring and Reporting

The REMADE TLC and REMADE Project Managers will monitor each project's technical and cost performance. The TLC consists of the Node Leaders for each node. REMADE Project Managers oversee REMADE Institute-awarded projects and work with the PIs to ensure they execute their projects on time, on budget, and consistent with the project SOPO. Project teams will submit the reports below to the REMADE Project Manager to fulfill their reporting requirements. The Node Leaders, TLC, other authorized REMADE staff members, and the DOE will access these reports in the course of their official duties.

Monthly status reports (in a format to be provided by the REMADE Institute), which include the schedule and any technical deliverables completed in the month covered by the report. Monthly reports are due by the 15th of the month following the month covered by the report.

Quarterly status reports at the end of each quarter of the project (in a format provided by the REMADE Institute). Quarterly status reports include schedule and budget progress and any technical deliverables completed in the quarter covered by the schedule. Quarterly reports are due by the 15th of the month following the quarter covered by the report.

Quarterly technical review (in a PowerPoint template provided by the REMADE Institute).

Final technical report (in a format to be provided by the REMADE Institute) that provides a comprehensive, cumulative, and substantive summary of the progress and significant accomplishments achieved during the total period of the REMADE project effort. Final reports are due within 45 days after the end of the project end date. (Note: final reports do not replace, and are in addition to, the last quarterly report for your project.)

Go/No-Go decision points -Technical RD&D and Traditional R&D Projects will be subject to a rigorous review of Go/No-Go decision points both during and at the end of each phase of the project. Go/No-Go decision points are key accomplishments that a project team must achieve, and the REMADE Institute must validate them to warrant the continuation of the proposed project. Therefore, Go/No-Go decision points will be proposed by the team, modified, if necessary, and approved by the REMADE Institute and DOE to minimize any ambiguity in the Go/No-Go decision and the method for validating the decisions.

7 Proposal Submission and Award Timeline

The timeline for submission of the LOIs and proposals and proposal evaluations and selections is provided below. Following REMADE selection and DOE approval, the REMADE Institute anticipates launching these projects in February 2024.

Key Dates for Request for Proposals (RFP) REMADE-23-01	
Proposal Activity	**Key Dates***
Request for Proposals Released	February 23, 2023
RFP Information Session	February 27, 2023
Letters of Intent Due	March 27, 2023
Proposals Due	April 26, 2023
Proposal Teams Notified of Decision	June 2023
Anticipated Project Start Date	February 2024

8 Additional Information

Additional information about the REMADE Institute and the RFP process is available at the following links:

- REMADE Overview and Membership Information
- LOI and Proposal Templates
- Project Impact Calculator
- REMADE Technology Roadmap

Contact REMADE_RFP@remadeinstitute.org or our Project Call Webpage for general questions about this RFP.

Appendix A REMADE Institute Technical Performance Metrics

To measure the performance of its technology development portfolio, the REMADE Institute has established the following **technical performance metrics (TPMs)**:

25% Improvement in Embodied Energy Efficiency
Demonstrate through innovative material reuse, recycling, remanufacturing, and reprocessing technologies a 25 percent (25%) improvement in embodied-energy efficiency (% change in BTU/ kg product) through first-of-their-kind demonstrations at manufacturing plants or major processes within five years of Institute operation, supporting a goal of at least fifty percent (50%) improvement in embodied-energy efficiency within ten years following initial Federal support for the REMADE Institute.

Demonstrate Potential for Cost Parity for Secondary Feedstocks and Energy Parity for Secondary Feedstocks
Develop tools and technologies to quantitatively increase energy productivity by reducing the cost of key secondary feedstocks in existing processes to at or below cost parity of primary feedstocks (modeled costs based on technologies being demonstrated) relative to the existing state-of-the-art within five years and be on a pathway to achieve, at minimum, installed and operating cost parity for the secondary feedstocks at full scale.

Demonstrate a 30% Increase in the Recycling/Reuse Rate
Research, develop, and demonstrate improved recycling and reuse in materials manufacturing to enable a 30% absolute increase in recycling rates of specific energy-intensive materials as a prioritized portfolio of technologies.

Demonstrate a 20% Reduction in associated GHG Emissions and a 10X Reduction in Primary Feedstock Use
Improved Material Efficiency and Decreased GHG Emissions: Research, develop, and demonstrate, at a representative pilot scale, at least one cost-effective energy intensive/dependent process that achieves a 10x reduction in primary material feedstock (kg/kg product) with improved energy efficiency (% relative to baseline), and 20% lower GHG emissions (ton CO2 eq./kg) relative to commercial state-of-the art at the relevant production rate (kg per day).

Demonstrate a 30% Secondary Feedstock Increase and a 30% Primary Feedstock Reduction
Demonstrate approaches to cost-effective cross-industry use of secondary feedstocks. Develop and demonstrate at minimum pilot scale at least one process with relevant and quantified operating times that enables the reuse of recycled and recovered materials to serve as cost-effective material feedstocks for one or more industries.

Demonstrate a 30% Reduction in Energy to Process Secondary Feedstocks
Develop tools and technologies to reduce the total energy required to process secondary materials by thirty percent (30%) relative to the existing state-of-the-art within five years and be on a pathway to achieve a 50% reduction for the secondary materials processing at full scale within 10 years.

Appendix B Technology RD&D Project Topics

This RFP solicits proposals for Technology RD&D project proposals focused on ***developing and demonstrating (TRL 6-7) tools and technologies*** consistent with the REMADE Institute's goals to reduce energy and emissions, achieve "better than cost and energy parity," and promote the widespread application of new enabling technologies across multiple industries. By the end of these projects, respondents must conduct technology demonstrations in "relevant[12]" (TRL 6) or "operational[13]" (TRL 7) environments, which the REMADE Institute anticipates will motivate the industry investments required to complete technology development and deploy these technologies across the U.S. manufacturing ecosystem.

The only difference between the two topics for this AOI (A1-A2) is whether the Technology RD&D project involves tools and technologies developed as part of a prior REMADE Institute-funded project (Topic A1) or independently of REMADE Institute funding (Topic A2).

The guidance below applies to topics A1 and A2. Technology RD&D project proposals should address each of the points outlined below.

The defining requirements of Technology RD&D projects are as follows:

- Technology RD&D projects must support the mission of the REMADE Institute, enable the Institute to achieve its stated goals, and impact the REMADE Technical Performance Metrics (TPMs) listed in Appendix A.
- Technology RD&D projects **must demonstrate the tools and technology in a relevant (TRL 6) or operational (TRL 7) environment** by the end of the project.
- Technology RD&D projects align to a single REMADE Node; however, projects that align to multiple nodes are also allowed.
- Technology RD&D projects must demonstrate how the technology solution will be integrated into existing supply chains and articulate a clear path to transition the tools and technologies to the marketplace.
- **Technology RD&D projects must include at least one industry partner who actively guides the project.**

Topic A1: Technology RD&D Projects to Demonstrate Tools and Technologies Developed as Part of Prior REMADE Institute-funded Projects

The REMADE Institute seeks proposals for Technology RD&D projects to ***develop and demonstrate (TRLs 6-7)*** tools and technologies developed as part of a prior REMADE Institute-funded project.

[12] An relevant environment is a testing environment that simulates both the most important and most stressing aspects of the operational environment.

[13] An operational environment addresses all the operational requirements and specifications required of the final system, including platform/packaging.

Topic A2: Technology RD&D Projects to Demonstrate Tools and Technologies Developed Independently of REMADE Institute Funding.

The REMADE Institute seeks proposals for Technology RD&D projects to ***develop and demonstrate (TRLs 6-7)*** tools and technologies developed independently of REMADE Institute funding.

To avoid duplication of prior REMADE Institute-funded projects, teams interested in proposing against topic A2 are encouraged to review the current project portfolio. In addition, Appendix D contains a list of projects the REMADE Institute has funded, organized by node and material class.

Appendix C Traditional R&D Project Topics

This RFP solicits Traditional R&D project proposals to develop tools and technologies that are consistent with the research priorities in the REMADE Technology Roadmap, complement the current R&D portfolio, and enable the REMADE Institute to achieve its goals and TPMs.

Traditional R&D projects need only **validate** the technology by the project's end. Consistent with a number of the Traditional R&D projects the REMADE Institute previously selected, Traditional R&D projects that **demonstrate the tools and technology** (TRLs 6-7) by the project's end are allowed. The REMADE Institute will view these projects more favorably than Traditional R&D projects that validate the technology by the project's end.

The four topics (B1-B4) that will be the focus of this AOI for RFP REMADE-23-01 align with four of the five Nodes of the REMADE Institute.

Topic B1: Systems Analysis & Integration Topic – Material Flow, Life Cycle Analysis, Systems Analysis, and Techno-economic Analysis Models, Tools, and Data

The REMADE Institute seeks proposals to develop and demonstrate the following:

a. *Potential to decrease primary feedstock consumption, increase secondary feedstock consumption, and reduce embodied energy and emissions in the U.S. healthcare sector by switching from single-use to reusable metalware and plastics:* To counter the growing trend within the U.S. healthcare system toward designing stainless steel instruments (e.g., scissors, needle holders) and plastic packaging for single-use applications, the REMADE Institute seeks proposals that explore circularity opportunities for metalware and plastics used in healthcare settings. Using material flow analysis, proposers should quantify the amount of single-use metal and plastic the U.S. healthcare sector could replace with reusable products at the national level and the corresponding reduction in embodied energy. This analysis will require teams to collect detailed information on the metal grades used for single- and multiple-use applications. In addition, proposers should conduct a first-order Life Cycle cost analysis to evaluate economic feasibility. In parallel, proposers should identify specific approaches to increase the collection and recovery of this material.

Topic B2: Manufacturing Materials Optimization Topic – Manufacturing Processes and Qualification Methods that Enable Greater Use of Cost-Competitive Secondary Feedstocks, Including Cross-Industry Feedstocks

The REMADE Institute seeks proposals to develop and demonstrate the following:

a. *Manufacturing processes that reduce primary material consumption by directly reusing scrap, improving material efficiency, reducing waste, or increasing secondary feedstock use, including cross-industry feedstock use:* Topics of interest include the development of (a) manufacturing processes that directly reuse scrap generated during manufacturing, and (b) new or alternative manufacturing processes or modified or optimized manufacturing processes to either improve process yields and reduce scrap generation (increase material efficiency) during manufacturing or enable greater use of secondary or cross-industry feedstocks.

b. Application of machine learning or artificial intelligence to guide process development and development of real-time sensing and control strategies to adjust manufacturing processes that *use secondary or cross-industry feedstocks:* Topics of interest include (a) application of machine learning or artificial intelligence tools to develop processing approaches or develop digital twins of the manufacturing process to accelerate the identification of manufacturing process parameters, and (b) approaches that employ machine learning, artificial intelligence, or real-time control strategies to make real-time process adjustments to manufacturing processes based on chemical/material variations inherent in secondary or cross-industry feedstocks.

The REMADE Institute is not interested in receiving proposals that use existing (off-the-shelf) blends of primary and secondary feedstock or do not propose to increase the ratio of secondary feedstock to primary feedstock used. However, proposers should validate developed technologies using recovered, sorted, cleaned, separated, decontaminated, and reprocessed materials.

Topic B3: Remanufacturing & End-of-life Reuse Topic – Cost-effective and Energy-Efficient Technologies for Disassembly, Cleaning, Restoration, and Condition Assessment to Increase Remanufacturing and Reuse at End-of-life.

The REMADE Institute seeks proposals to develop and demonstrate the following:

a. *Utilization of machine learning or artificial intelligence to facilitate condition assessment of used products and components:* Topics of interest include condition assessment approaches that utilize machine learning or artificial intelligence to enable automated non-destructive inspection/evaluation of a) cores (used products) to determine residual value before disassembly and cleaning, and b) mechanical components, electronic components, or electro-mechanical systems to determine suitability for reuse or repair.
b. *Low-cost component repair technologies to repair or restore wind turbine generators and drive trains:* Topics of interest include cost-effective repair or restoration processes for wind turbine generators or drive trains, including new or alternative repair processes targeted at components where no repair process currently exists or current repair process costs limit the number and types of components that remanufacturers can repair. The REMADE Institute encourages proposals to modify existing repair processes to a) increase component reuse yield, b) increase the number of times remanufacturers can repair a component, or c) extend the repair to new regions of the component.
c. *Technologies to remanufacture, repurpose, repair, or refurbish electric vehicles and batteries:* Topics of interest include the development of (a) cost-effective approaches to repair/restore high-value electric vehicle (EV) cores and components, (b) methods to repurpose or reconfigure battery cells for other applications, (c) automated non-destructive inspection/evaluation approaches that target inspection or evaluation of EV batteries, and d) condition assessment technologies for evaluating EV batteries.

Topic B4: Recycling & Recovery Topic – Technologies to Rapidly and Efficiently Collect, Characterize, Sort, Separate, and Decontaminate Recovered Waste Streams and Produce Cost-competitive Secondary Feedstocks, Including Cross-Industry Feedstocks

The REMADE Institute seeks proposals to develop and demonstrate technologies that:

a. *Increase the recycling rate of #3-#7 plastics, textiles, apparel, and PET thermoform packaging and the availability of high-quality, cost-competitive secondary feedstocks, including cross-industry feedstocks:* Topics of interest include mechanical and chemical recycling technologies. Proposals that target materials with low recycling rates are of particular interest. Examples include plastics with resin identification codes #3-#7, textiles, and apparel. The REMADE Institute also encourages proposals to develop technologies to increase the amount of PET thermoform packaging that can be processed with PET bottles to produce bottle-grade rPET.
b. *Improve yield, throughput, and accuracy when sorting recycled materials:* Topics of interest include greater use of automation to sort waste streams, adaptive sorting technologies that incorporate advances in AI, and neural networks or sort based on the contaminants present. Specific applications of interest include (a) sorting non-used beverage container (UBC) aluminum from UBC in the MRF; (b) cost-effective automated methods to sort post-consumer and post-industrial textiles into numerous market grades (resale, rag, fiber reclaim, and chemical recovery); (c) novel sorting solutions for aluminum alloys, high-strength low-alloy (HSLA) steels, or other alloys with high embodied energy (including superalloys) to minimize mixing of different alloy grades and avoid continued downcycling; and (d) identification of innovative mechanical and optical sorting configurations in scalable designs that could enable cost-competitive rural, single-stream recycling (targeting system throughput of 1-15 tons/hr.).
c. *Enable cost-effective physical, chemical, or biochemical separation of metals, polymers, and glass in photovoltaics and Evs:* Topics of interest include separating metals, polymers, and glass in photovoltaics and Evs. In addition, proposals involving hybrid techniques that combine separation approaches (i.e., physical and chemical), or apply machine learning and artificial intelligence to facilitate the separation of waste streams, are also of interest.
d. *Enable rapid, robust, cost-effective characterization, standardization, and decontamination of recycled materials:* Topics of interest include (a) technologies to rapidly and effectively detect and characterize the presence of different contaminants relevant to metals, plastics, fibers, and e-scrap; (b) technologies for assessing and standardizing the composition and quality of secondary streams by material or application; (c) technologies for removing contaminants present in recovered waste streams; and (d) technologies, including machine learning or artificial intelligence, that adaptively adjust decontamination procedures or identify the best end-use based on the contaminants that are present.

Please note that **the following topics will not be considered responsive to this AOI of this RFP**: recycling of batteries, recovery of rare earth metals, and recycling of materials that already have an established market (e.g., newsprint, old corrugated cardboard, #1 and 2 plastics, metals, etc.). The REMADE Institute encourages projects where manufacturers validate that the materials that they have recovered, sorted, cleaned, separated, decontaminated, and reprocessed can replace primary materials without loss of properties or performance.

Appendix D REMADE Institute Funded Projects Organized by Node and Material Class

To assist teams that want to submit a proposal addressing Topics A2 or B1-B4, this Appendix contains five tables, D1-D7, that identify the eighty-two (82) projects the REMADE Institute has funded for each Node (Focus Area) and in Education & Workforce Development. The REMADE Institute encourages teams wishing to learn more about any of these projects to review the project description for each project in the current R&D portfolio.

Table D1. REMADE Institute-funded Projects Aligned to each Technical Thrust Area in the Systems Analysis & Integration Node

SYSTEMS ANALYSIS & INTEGRATION			
TECHNICAL THRUST	**TASK #**	**PROJECT TITLE**	**MATERIAL**
Methods, Tools, & Data	10.1	Systems Analysis for PET and Olefin Polymers in a Global Circular Economy*	Polymers
	10.2	Mapping the Materials Base for REMADE*	Metals, Fibers, Polymers, Used Electronics
	10.6	Dynamic Systems Analysis of PET and Olefin Polymers in a Circular Economy	Polymers (PET, Polyolefins)
	10.9	Modeling Reverse Flows of Selected Recycled Materials, their Associated Energy Use and their GHG Emissions – An Application to California and a Blueprint for the US	Metals, Fibers (Paper), Polymers, Used Electronics
	6.2	Assessment of the Impact of Single Stream Recycling on Paper Contamination in Recovery Facilities and Paper Mills*	Fibers (Paper)
Techno-Economic Analysis, Models & Tools	10.4	A Dynamic Techno-economic Systems Modeling Framework for U.S. Fiber Recycling*	Fibers (Paper)
	10.5	Identifying strategies to maximize benefit of fiber recovery through systems quantification*	Fibers (Paper)
	10.8	A Technical Evaluation Framework for Recycling Technologies [F][24]	Metals/Polymers
	6.8	Evaluation of Logistics systems for collection- preprocessing and production of secondary feedstocks from Used Electronics*	Used Electronics

Projects marked with an asterisk (*) have been completed.

Table D2. REMADE Institute-funded Projects Aligned to each Technical Thrust Area in the Design for Re-X Node

DESIGN FOR RE-X			
TECHNICAL THRUST	**TASK #**	**PROJECT TITLE**	**MATERIAL**
Design for Re-X Metrics & Assessment Frameworks	9.1	Development of an Industrially Relevant RE-SOLAR Design Framework*	Used Electronics, Metals
	9.2	Design for Remanufacturing*	Metals
Design for Re-X Tools	9.3	Data-Driven Design Decision Support for Re-X of High-Value Components in Industrial and Agriculture Equipment*	Metals
	9.4	Quantification of Financial and Environmental Benefits Tradeoff in Mutigenerational Product Family Development Considering Re-X Performances	Metal (Steel)
	9.5	Design Iteration Support Tool to Sustain Remanufacturability	Metals (Steel)
	9.6	Material and Vehicle design for High-Value Recycling of Aluminum and Steel Automotive Sheet	Metals (Aluminum)
	9.7	Analysis and Design for Sustainable Circularity of Barrier Film in Sheet Molding Composites	Polymers, Composites
	9.8	Building Re-X (BREX): Data, Methodology, and Design Integration	Metals, Polymers
	9.9	Design for RE-Solar	Metals, Used Electronics
	9.10	Development of a Novel Design for Remanufacturing Software Plugin for CAD	Metals
	9.11	Data-Driven Design Decision Support for Remanufacturing of High-Value Components in Industrial and Agricultural Equipment	Metals, Polymers

Projects marked with an asterisk (*) have been completed.

Table D3. REMADE Institute-funded Projects Aligned to each Technical Thrust Area in the Manufacturing Materials Optimization Node

MANUFACTURING MATERIALS OPTIMIZATION			
TECHNICAL THRUST	**TASK #**	**PROJECT TITLE**	**MATERIAL**
Characterization, Qualification, & Simulation Technologies	8.1	Increasing melt efficiency and secondary alloy usage in aluminum die casting*	Metals (Aluminum)
	8.2	Development of a Castable High Strength Secondary Aluminum Alloy from Recycled Wrought Aluminum Scrap*	Metals (Aluminum)
	8.5	CombiClean: Facilitating Contaminant Removal from Recycled Plastics	Polymers
	8.7	Achieving 100% recycling aluminum in die casting applications	Metal (Aluminum)
	8.12	Development of Computational Tools for Predicting Seam Weld Integrity in Thick-Walled Hollow Aluminum Extrusions	Metal (Aluminum)
Manufacturing & Process Control Technologies	8.3	Cross-Industry Utilization of Ground Tire Rubber for Energy Efficient Pavements	Rubber
	8.4	Biological and Bio-Mechanical Technologies for Recycled Fibers to Regain Fiber Quality and Increase Secondary Feedstock in High Value-Added Paper Grades	Fibers (Paper)
	8.6	Supramolecular Interfacial Reinforcement for Manufacture Utilizing Mixed Secondary Plastic Feedstock	Polymers (PE/PP)
	8.8	Enabling Cross-industry reuse of comingled waste plastics as quality asphalt modifier for sustainable pavement	Polymers (Rubber, GTR Equivalent)
	8.9	Sustainable Automotive Manufacturing	Polymers (PE to Nylons)
	8.10	Chemical Conversion and Process Control for Increased use of Polyethylene and Polypropylene Secondary Feedstocks	Polymers (PE/PP)
	8.11	Development of Manufacturing Technologies to Increase Scrap Steel Recycling into New Tires	Metals (Steel)
	8.13	Catalytic Upcycling of Polyolefins	Polymers (Polyolefins)

Projects marked with an asterisk (*) have been completed.

Table D4. REMADE Institute-funded Projects Aligned to each Technical Thrust Area in the Remanufacturing & End-of-life Reuse Node

REMANUFACTURING & END-OF-LIFE REUSE			
TECHNICAL THRUST	**TASK #**	**PROJECT TITLE**	**MATERIAL**
Characterization, Qualification, & Simulation Technologies	7.4	Non-Destructive In-process Assessment of Thermal Spray Repairs*	Metals
	7.6	Nondestructive Evaluation of In-flight Particle Dynamics and Intrinsic Properties for Thermal Spray Repairs*	Metals (Steel)
	7.8	Rapid Damage Identification to Reduce Remanufacturing Costs	Metal (Steel)
Manufacturing & Process Control Technologies	7.1	Quantitative Non-Destructive Evaluation of Fatigue Damage Based on Multi-Sensor Fusion*	Metals (Steel)
	7.2	Remaining Life Determination*	Used Electronics
	7.5	Condition Assessment of Used Electronics	Used Electronics
	7.11	Development of Instruments and Techniques that Can Assess Tire Life and Increase Re-Manufacturing of Commercial Vehicle Tires	Polymers, Metals, Tires
	7.13	Fast Diagnostics to Enable EV Battery Reuse	Used Electronics
	7.14	Automation for Remanufacturing of Battery Modules	Used Electronics
Low-Cost Component Repair Technologies & Restoration Methods	7.3	Epoxy/Silicon Potting Material Removal for Greater Recovery of Circuit Boards*	Used Electronics
	7.7	High Speed Maser Cladding for Hard Surface Replacement*	Metals
	7.9	Low-Heat Repair of Cast Iron	Metals (Cast Iron)
	7.10	Remanufacturing of Surface-Hardened Steel Components by Ultrasonic Surface Modification	Metals
	7.12	Development of Additive Manufacturing Material and Process Technologies to Improve the Re-Manufacturing Efficiency of Commercial Vehicle Tires	Polymers, Metals, Tires
	7.15	Improving Recycling Efficiency of Portable Electronics by Automating Battery Disassembly	Used Electronics
	7.16	High Speed Laser Cladding Repair Process Development	Metals (Steel)
	7.17	Development of Hybrid Repair and Nondestructive Evaluation Technologies for Aerospace Components	Metals (Steel)
	7.18	Hybrid Laser Processing for Metallic Surface Remanufacturing	Metals (Steel)

Projects marked with an asterisk (*) have been completed.

Table D5. REMADE Institute-funded Projects Aligned to Collection & Sorting and the Mechanical Recycling Thrust Areas in the Recycling & Recovery Node

RECYCLING & RECOVERY			
TECHNICAL THRUST	**TASK #**	**PROJECT TITLE**	**MATERIAL**
Technologies & Tools to Increase Collection & Recovery	**6.23**	Identification of Mixed Plastics and Valuable Electronics at the Source	Polymers, Used Electronics
	6.30	Recycling and Refining of Aluminum Foils and other Difficult Scraps	Metals (Aluminum)
Mechanical Recycling Technologies for Sorting, Separating, & Liberating Materials	**6.1**	Rapid Sorting of Scrap metals with Solid State Device*	Metals (Aluminum)
	6.4	Pushing the State of the Art in Steel Recycling through Innovation in Scrap Sorting and Impurity Removal*	Metals (Steel)
	6.6	Scalable High Shear Catalyzed Depolymerizations of Multilayer Plastic Packaging*	Polymers
	6.7	Determining Material, Environmental and Economic Efficiency of Sorting and Recycling Mixed Flexible Packaging and Plastic Wrap*	Polymers (Used Electronics)
	6.9	Material Characterizations and Sorting Specifications That Can Alloy the Development of Advanced Tire Constructions with High Incorporation of Recovered Rubber Materials	Rubber
	6.10	Reinforced Recycled Polymer Composites (RRPC)	Polymers
	6.11	Low-Cost, High-Value Metal Recovery from Electronics Waste to Increase Recycling and Reduce Environmental Impact*	Used Electronics (PGMs)
	6.14	Low-Concentration Metal Recovery from Complex Streams Using Gas-Assisted Microflow Solvent Extraction*	Used Electronics (PGMs)
	6.15	Development and Validation of Metal Separation Technology for Complete Metal Streams	Used Electronics (PGMs)
	6.16	Dynamic Crosslinking to Enable EVA Recycling	Polymers
	6.17	Recycling of PET in Sustainable Food Packaging Systems	Polymers
	6.20	Diverting Mixed Polyolefins from Municipal Solid Waste to Feedstocks for Automotive and Building Applications	Polymers
	6.22	Smart Additive Manufacturing Towards Use of Recycled Paper Fibers for Producting High-quality Fiver-Reinforced Plastic (FRP) Composites	Fibers (Paper)
	6.26	Enhanced Processing of Aluminum Scrap at End-of-life via Artificial Intelligence & Smart Sensing	Metals (Aluminum)
	6.31	Development of an Automated Method for Disassembly and Separation of Apparel for Recycling	Polymers (PET), Cotton

Projects marked with an asterisk (*) have been completed.

Table D6. REMADE Institute-funded Projects Aligned to Chemical & Solvent-Based Recycling & Separation and the Characterization, Cleaning & Purification Thrust Areas in the Recycling & Recovery Node

RECYCLING & RECOVERY (CONTINUED)			
TECHNICAL THRUST	**TASK #**	**PROJECT TITLE**	**MATERIAL**
Chemical & Solvent-Based Recycling & Separation (atomic/ molecular) Technologies	6.12	Chemical Recycling of Mixed Plastics and Valuable metals in the Electronic Waste Using Solvent-Based Processing*	Polymers (Used Electronics)
	6.18	Delamination as Key Enabler for the Recycling of Polymer-based Multilayer Packaging	Polymers
	6.21	Chemical recycling of Mixed PET/Polyolefin Streams Through Sequential Pyrolysis and Catalytic Upgrading	Polymers
	6.24	Reprocessing and Upcycling of Mixed Polyurethane Waste Streams	Polymers
	6.27	Low-Cost, High-Value Aromatics from Upcycling of Polyolefins Through Microwave Catalytic Processing	Polymers (PE/PP/PS)
	6.28	Recovery of Plastics and Natural Fibers from Non-Recyclable Municipal Solid Waste for Composites Production	Polymers (PET/PE/PP/PS)
	6.29	Recycling Technologies for Silicon Solar Modules	Used Electronics, Metals, Polymers
Characterization, Cleaning, & Purification Technologies	6.3	Demineralization of Carbon Black Derived from End-of-Life Tires*	Carbon Black
	6.5	Removing Trace Contaminants in Recycled Metals*	AM
	6.13	New Approaches to Improve Deinking Flotation to Increase the Availability of High-Quality, Low-Cost Recycled Paper Fibers*	Fibers (Paper)
	6.19	Selective Recovery of Elements from molten Aluminum Alloys	Metal (Aluminum)

Projects marked with an asterisk (*) have been completed.

Table D7. REMADE Institute-funded Education & Workforce Development Projects

EDUCATION & WORKFORCE DEVELOPMENT			
TECHNICAL THRUST	**TASK #**	**PROJECT TITLE**	**MATERIAL**
Education & Workforce Development	11.1	Advanced Education and Workforce Training in Fibers Recycling*	Fibers (Paper)
	11.2	Education and Workforce Development on Chemical Recycling of Plastics	Polymers
	11.3	Course on Systems Thinking for Material Management: Benefit and Tools	Misc.

Projects marked with an asterisk (*) have been completed.