



# CRADA with FedIMPACT, LLC (Project 1)

## Cooperative Research and Development Final Report

CRADA Number: CRD-17-00713

NREL Technical Contact: Andrey Bernstein

**NREL is a national laboratory of the U.S. Department of Energy  
Office of Energy Efficiency & Renewable Energy  
Operated by the Alliance for Sustainable Energy, LLC**

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Contract No. DE-AC36-08GO28308

**Technical Report**  
NREL/TP-5D00-80386  
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#### **Suggested Citation**

Bernstein, Andrey. 2021. *CRADA with FedIMPACT, LLC (Project 1): Cooperative Research and Development Final Report, CRADA Number CRD-17-00713*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5D00-80386. <https://www.nrel.gov/docs/fy21osti/80368.pdf>.

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## NOTICE

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**Cooperative Research and Development Final Report**

**Report Date:** March 21, 2019

In accordance with requirements set forth in the terms of the CRADA agreement, this document is the CRADA final report, including a list of subject inventions, to be forwarded to the DOE Office of Scientific and Technical Information as part of the commitment to the public to demonstrate results of federally funded research.

**Parties to the Agreement:** FedIMPACT, LLC

**CRADA Number:** CRD-17-00713

**CRADA Title:** CRADA with FedIMPACT, LLC (Project 1)

**Responsible Technical Contact at Alliance/National Renewable Energy Laboratory (NREL):**

Andrey Bernstein | [andrey.bernstein@nrel.gov](mailto:andrey.bernstein@nrel.gov)

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Cyril Yee | [cyril.yee@ipgroup-inc.com](mailto:cyril.yee@ipgroup-inc.com)

**Sponsoring DOE Program Office(s):**

Office of Energy Efficiency & Renewable Energy (EERE) Small Business Voucher (SBV) Program; Office of Energy Efficiency & Renewable Energy (EERE) Energy I-Corps

**Joint Work Statement Funding Table showing DOE commitment:**

No NREL Shared Resources (or DOE funding)

<b>Estimated Costs</b>	<b>NREL Shared Resources a/k/a Government In-Kind</b>
Year 1	\$ .00
TOTALS	\$00.00

**Executive Summary of CRADA Work:**

The funds-in under the CRADA will fund a team of National Renewable Energy Laboratory (NREL) researchers to participate in Energy I-Corps (formerly known as Lab-Corps). Energy I-Corps pairs teams of researchers with industry mentors for an intensive two-month training where the researchers define technology value propositions, conduct customer discovery interviews, and develop viable market pathways for their technologies. FedIMPACT, LLC and its affiliate IP Group, Inc. will evaluate the work completed at Energy I-Corps to determine whether it would

like to pursue further commercialization and development of related technologies and background intellectual property.

### **Summary of Research Results:**

In this project, Emiliano Dall'Anese and Andrey Bernstein participated in the Energy I-Corps program in order to facilitate the technology-to-market path for the technology developed under the ARPA-e NODES RONIN project.

The participating team consisted of Emiliano Dall'Anese, the Principal Investigator (principal investigator); Andrey Bernstein, the Entrepreneurial Lead (entrepreneurial lead); and Fabio Mantovani from Centrica, as the industry mentor.

Overall, the following tasks and activities were pursued during the program:

1. Team presentations: a weekly presentation to the program participants on the progress of the team.
2. Lectures: in person presentations during the first and the last days of the program in Golden, CO and Washington, DC.
3. Workshop activities: preparation of slides, homework, reading books.
4. Customer discovery and other interviews: in person and phone interviews with more than 80 potential customers and competitors.
5. Travel to the closing session in Washington, DC.
6. Participation in weekly webinars.
7. Completion of pre- and post-training surveys.
8. Communications deliverables due during and after training.

Over the course of the program, the team explored potential market pathways for the technology developed under the ARPA-e NODES RONIN project and presented a plan that includes next steps for that pathway at the closing session. The summary slides that present the detailed outcomes of this project are the deliverables (as described next).

### **Achieved Milestones**

- Attended all in-person sessions and participated in all workshops and team presentations.
- Attended all web-based sessions and participated in group discussions and team presentations.
- Completed baseline and post-training surveys.
- Engaged with FedIMPACT, LLC and its affiliate IP Group, Inc for periodic discussions to share learnings and agree on future direction.
- Attended graduation session and participated in team presentations (FedIMPACT, LLC and its affiliate IP Group, Inc. participated in these meetings)—see the attached slides that summarize the outcomes.
- Met with NREL's Technology Transfer/Commercialization Office before, during, and after program for sharing learnings and receiving feedback.

**The following deliverables were produced (FedIMPACT, LLC and its affiliate IP Group, Inc. has access to all deliverable and results)**

- Daily/weekly presentation assignments as detailed in the syllabus
- Capstone team presentation that incorporates learnings from the course (attached)
- Graduation presentation (attached)
- 1-2 minute team video to be shown at graduation
- Interviews and Business Model Canvas (BMC) iterations entered into LaunchPad Central application
- Peer feedback on team presentations in LaunchPad Central
- Conducted Office Hours with faculty for targeted team feedback

**Subject Inventions Listing:**

None

**ROI #:**

None

**Appendix A (Supplemental Document – Slide Deck)**



## The Team



Emiliano Dall'Anese  
PI, NREL



Andrey Bernstein  
EL, NREL



Alex Wolf  
co-EL,DU/NREL



Fabio Mantovani  
IM, Centrica

## The problem

in current centralized grids



## The centralized grid is...

**Unreliable, fragile, coal-heavy grid**  
fundamentally unable to integrate  
distributed energy resources (DERs) at scale



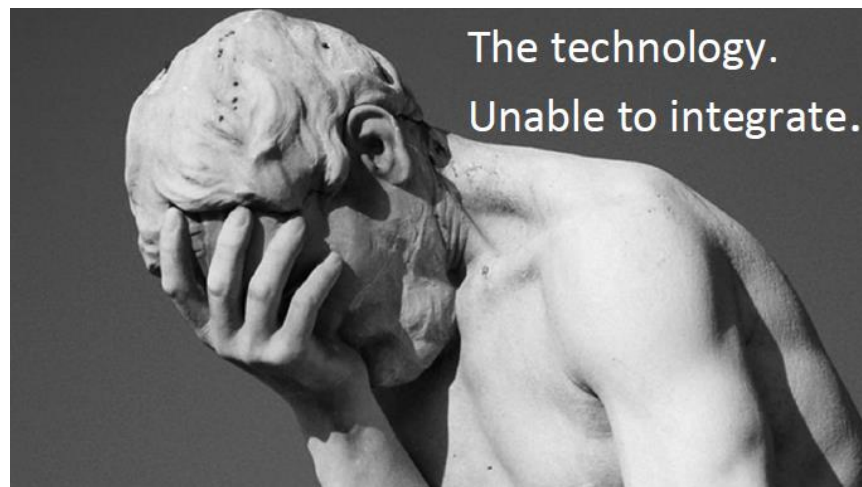
DERs are coming...

Distributed Energy Resource Management System Market worth 603.6 Million USD by 2022

MARKETSANDMARKET

The graphic features a background image of wind turbines at sunset. A white box contains the market value projection, and a logo with four colored diamonds (yellow, blue, red, green) is in the bottom right corner.

What's the problem?



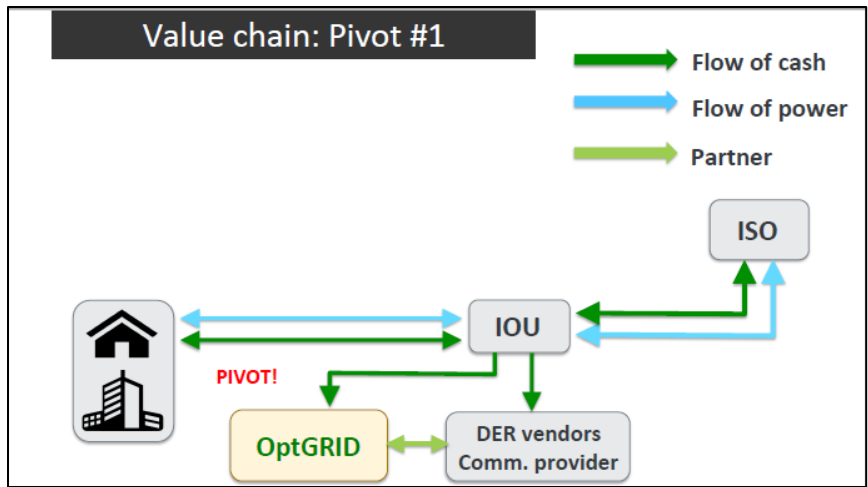
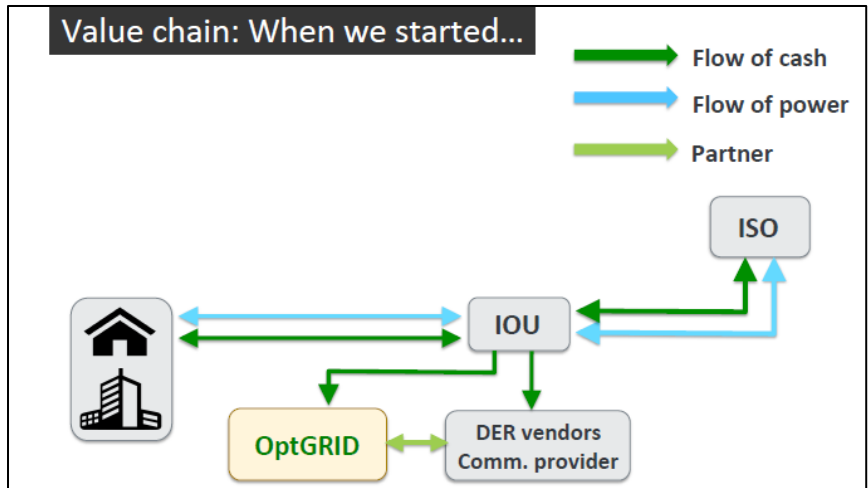


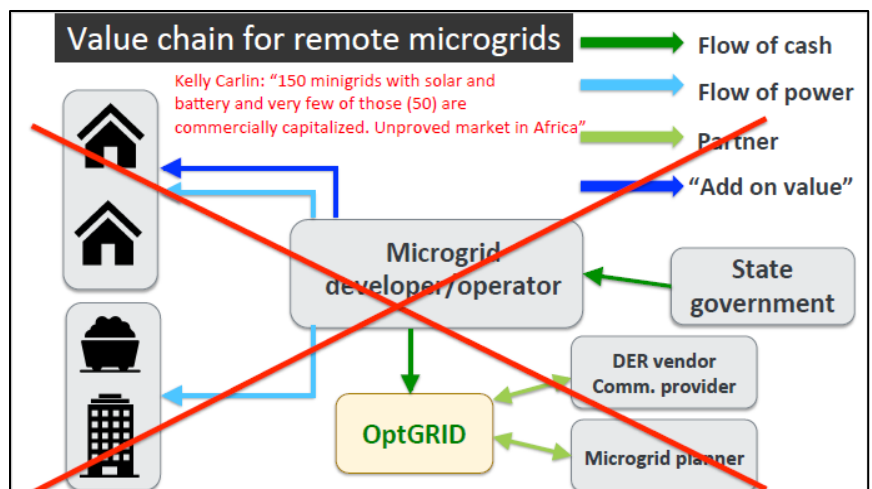
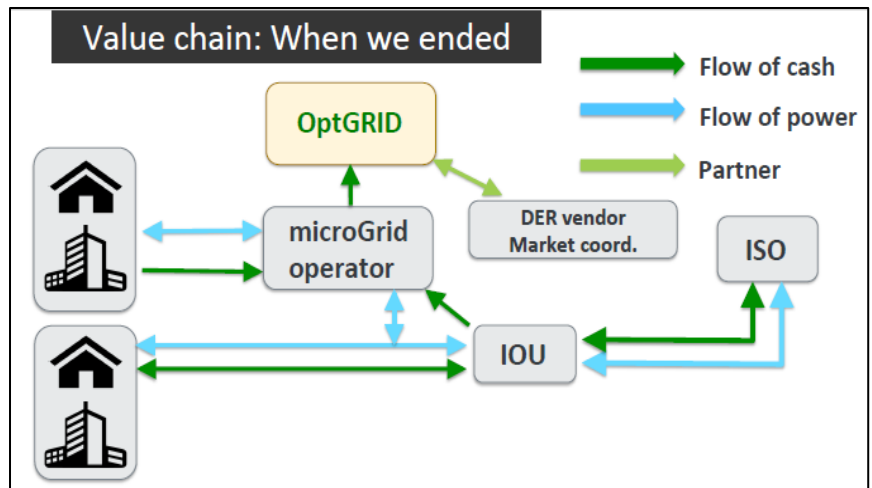
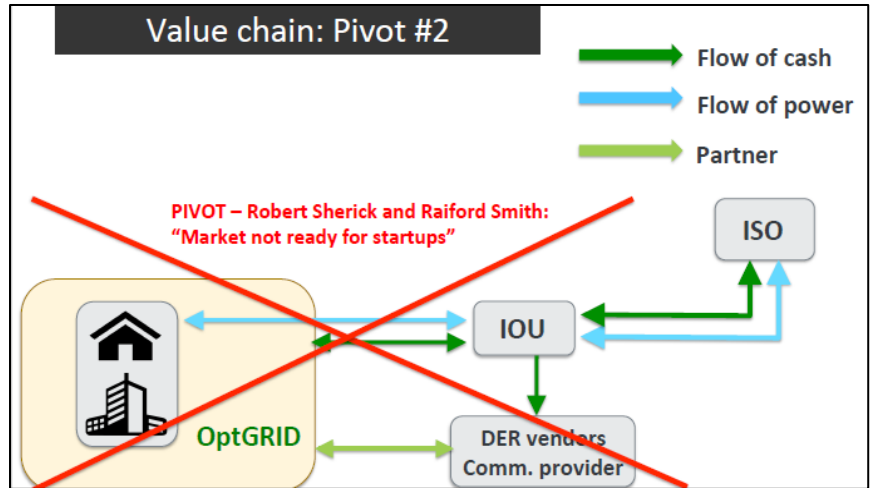


**Opt-Grid: New paradigm**

Software and hardware control platform that overcomes current technological barriers to

- enable **massive integrations of DERs**
- significantly increase **reliability, security, and efficiency**
- **empower** and connect end-customers and operators





## Customer Relationships

**Get:** Create awareness

- Web (e.g., linkedin, blogs, etc)
- Media
- Pilot

**Keep:**

- Add more features
- Free upgrades

**Grow:**

- Platform for data analytics



## Competition

Competitors are

- Centralized
- Cloud-dependent
- Slow acting
- Disregard network features



Advanced Microgrid Solutions



## Competition

Competitors are

- Centralized
- Cloud-dependent
- Slow acting
- Disregard network features

Opt-Grid

- Distributed
- Shared intelligence
- Real-time
- Network is accounted for

## Available Market

- Growth of community level microgrids is envisioned
- Community Choice Aggregation systems will become more popular
- Profit per typical microgrid: **~\$300k per year**

Available market:

- Few tens of customers in the first two years: **> \$3M per year**

## Next Steps

- Pilot
- Seed funding
- Early evangelists
- Start partnerships



Thank You