U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Challenges and Opportunities for VIPV: The Perspective of the U.S. Department of Energy

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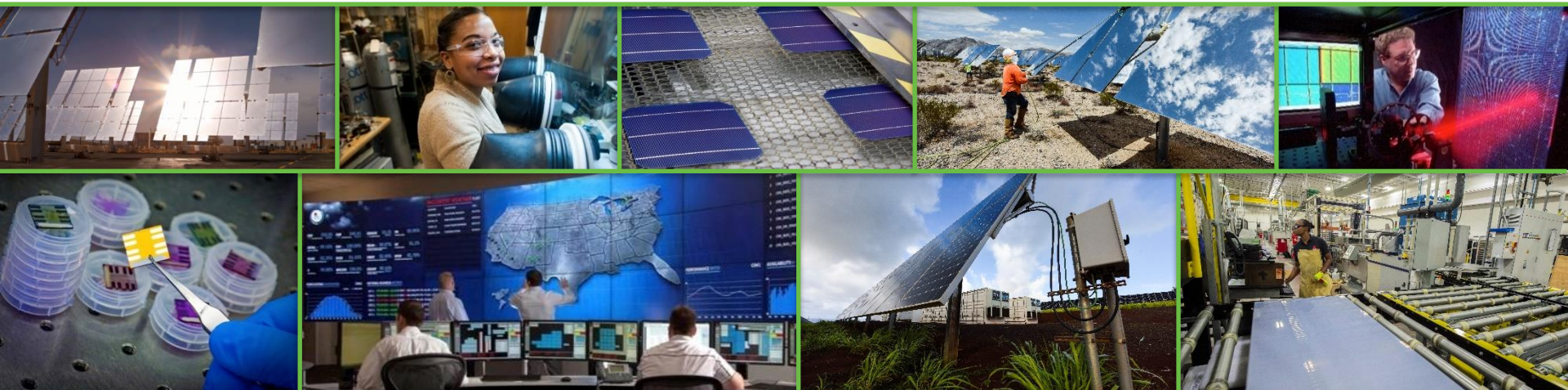

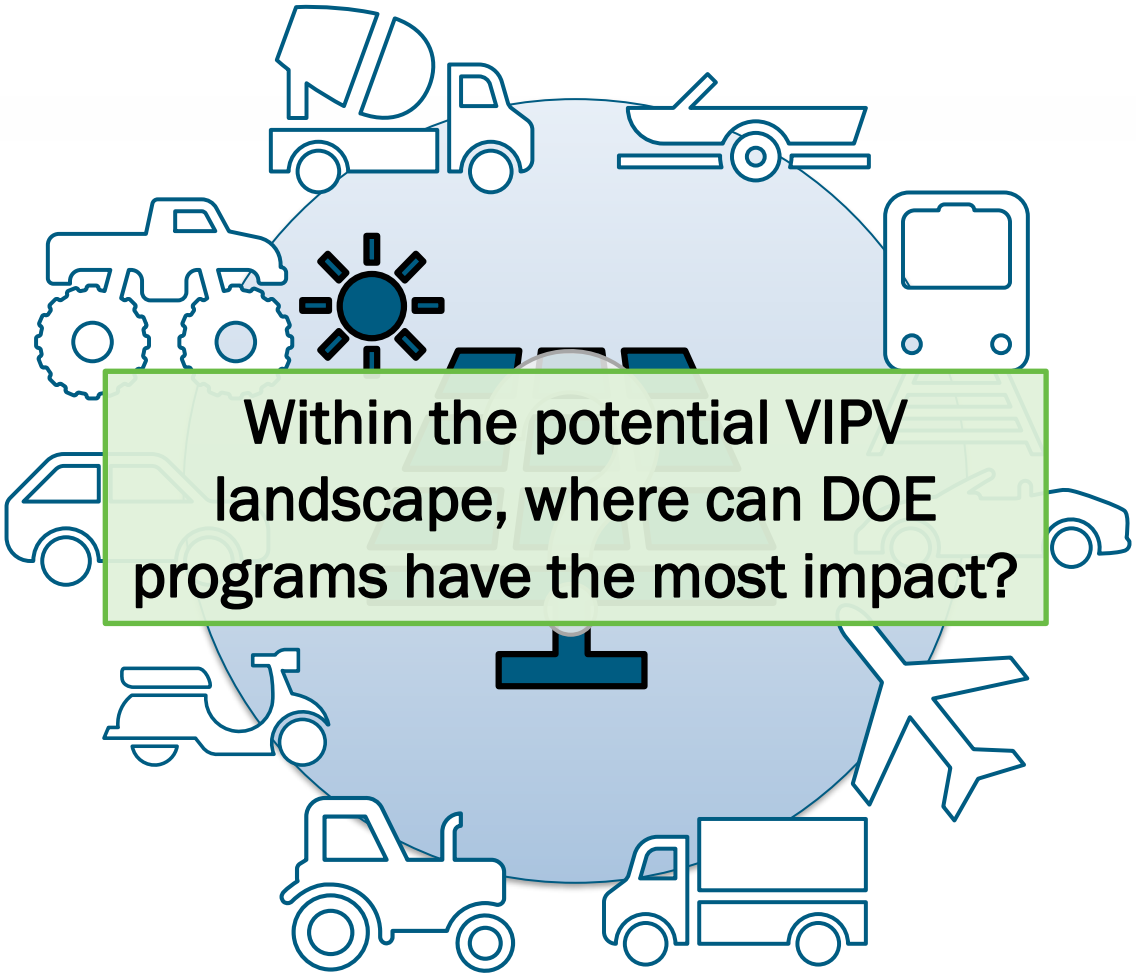

Within the potential VIPV landscape, where can DOE programs have the most impact?

The DOE VIPV Request for Information

In summer 2022, the DOE solar and vehicles offices released a joint request for information (RFI) to gather information about the VIPV/VAPV landscape and opportunities in the United States.

- **Goal**
  - Focus on current state of the industry, challenges and barriers, gaps, and R&D needs
  - Identify barriers and explore key opportunities to inform DOE strategic program development in VIPV
- **Respondents:** 15 responses from a variety of stakeholders
- Summary report at https://energy.gov/eere/solar/summary-vehicle-integrated-photovoltaics-request-information

RFI Details – Focus areas

State of the industry and key domestic markets

Product requirements

Key barriers and perceptions

RDD&C needs and opportunities

Stakeholder engagement processes

State of the Industry and Key Domestic Markets

1

Market Opportunities

1. Commercial trucks/trailers

- TRUs
- Local delivery fleet vehicles

2. Passenger vehicles

2

Use Cases

Primary

- Range extension
- Auxiliary power

Secondary

- Improved safety
- Backup power

3

U.S. Manufacturing

Opportunities

- Thin film PV technologies
- Components for VIPV systems

Benefits

- Support future VIPV market needs
- Bolster U.S. jobs

VIPV Product Requirements & Considerations

- Size & weight
- Cell performance
- Aesthetics
- Safety
- Reliability & durability
- Ease of maintenance

Key Barriers

Technical Barriers	Costs
	Performance (efficiency and durability)
	Technical complexity in repair and replacement
	Installation challenges
Perception and Collaboration Challenges	Unclear value proposition of VIPV
	Existing silos separating solar and vehicles industries
	Performance and reliability uncertainty

RDD&C Needs and Opportunities

1

Models and tool limitations

- Energy yield modeling
- Installed system cost modeling
- System integration

2

RD&D Needs

1. Impact resistance
2. Durability and lifetime
3. Safety and electronics access

3

Demonstration & Validation Challenges

- Lack of established standards and testing procedures
- Collaboration among many stakeholders
- Data collection

Stakeholder Engagement

KNOWLEDGE GAPS

- Product awareness and availability
- Performance uncertainty
- Lack of communication between vehicle and solar industries
- Unclear value proposition of VIPV/VAPV

OUTREACH MECHANISMS FOR DOE

1. Government-led information sharing with industry
2. Government facilitation of collaboration between industries
3. Promoting early-stage innovation through funding opportunities

DOE Takeaways

1

Focus on on-road vehicles

- VAPV for commercial trucks, particularly TRUs
- Passenger vehicles and commercial truck fleets are promising beachhead markets for VIPV/VAPV

2

Near-term opportunities

- VAPV adoption expected before VIPV, less product development needed
- VAPV could serve as a useful platform for data collection and validation

3

DOE Solar Office next steps

- Working with DOE vehicles office to identify stakeholders and develop programs
- Continuing to seek out VIPV/VAPV technology /markets/products that present most value proposition

QUESTIONS

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https://www.energy.gov/eere/solar/solar-energy-technologies-office

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