Association of Energy Engineers

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President

Photo: hiperia3d

# Transformative Technology: A Path to Resilience for Our Energy Infrastructure

Use Energy Responsibly

BRAID THEORY™

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Profitable Sustainability

# GLOBALCON
# Conference and Expo

*Energy, Power & Facility Management Strategies & Technologies Expo*

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# Agenda

- What is Energy Resilience?
- How to Embrace Technology to Address Resilience?
- Barriers to Accelerate Innovation
- Funding Opportunities and Investors' Expectations
- How Disruption Can Stimulate the Market?
- Technology Failure and Recovery
- Discussion

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*"a system's ability to **anticipate**, **prepare** for, and **adapt** to changing conditions and **withstand**, **respond** to, and **recover** rapidly from disruptions through sustainable, adaptable, and **holistic planning** and **technical solutions**"*

*– The National Renewable Energy Laboratory*

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*"The energy sector will need to* ***develop resilience*** *to climate change impacts through* ***technological solutions***, ***flexible management practices*** *as well as* ***preventive emergency preparedness*** *and* ***response*** *measures."*

*– International Energy Agency*

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Energy Efficiency

Demand Response

Micro-Grid

Energy Storage

Policy

Renewables

Backup Power

Code Modifications

Fuel Cells

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# TECHNOLOGICAL SOLUTIONS

## Examples of Emerging Tech and Integrated Systems

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# Owlized

The face of public virtual reality.

Location-based immersive tools with climate adaptation application.

Communicate and visualize climate change.

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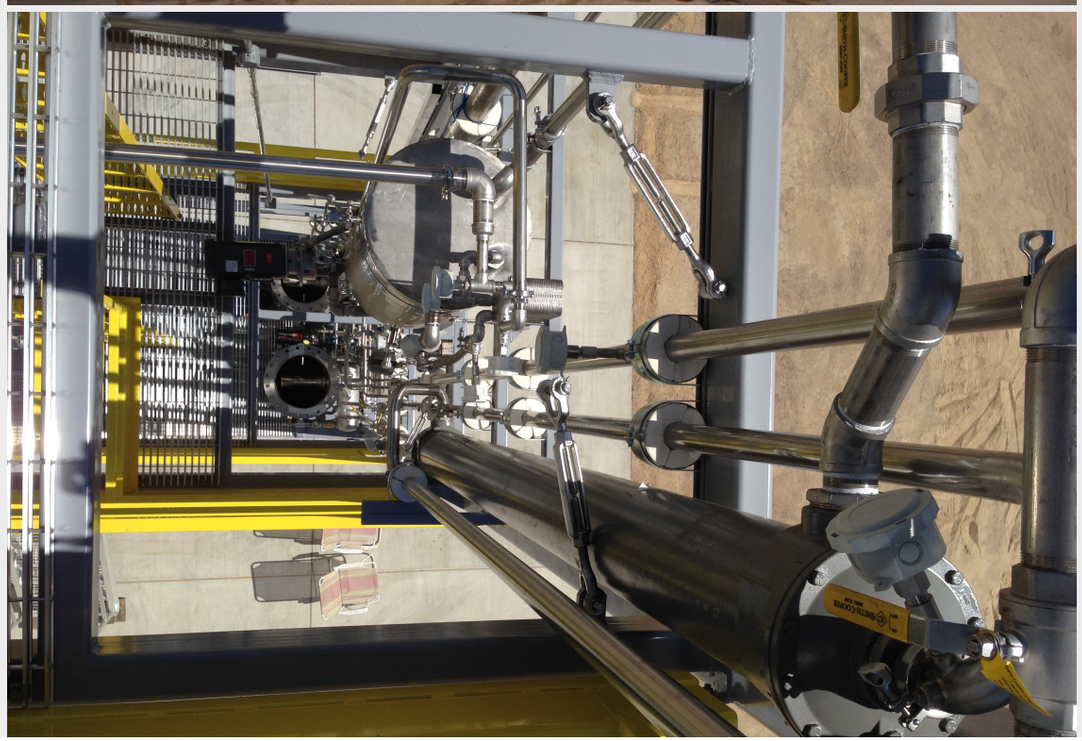
# Greenbelt Resources

End-to-end waste-to-ethanol solutions.

Energy efficient ethanol dehydration through membrane technology.

Organic waste recycling:

- feed
- fertilizer
- fuel
- filtered water



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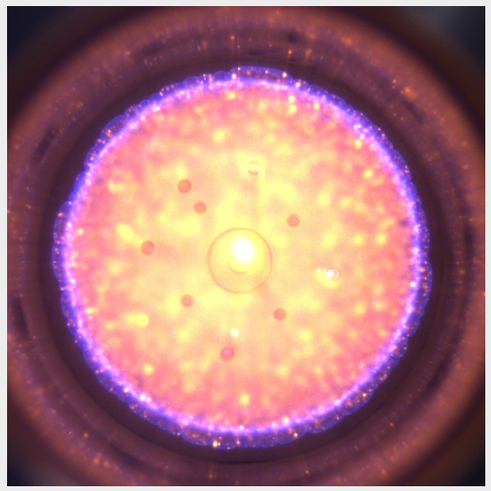
# Transient Plasma Systems

Pulsed power systems for research and commercial applications.

Non-thermal plasma that exists during the transient, formative phase of an arc.

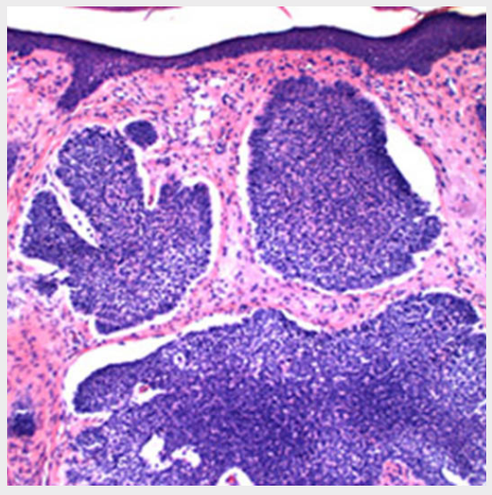
Other applications: extraction of biofuels from algae, ozone generation, and wound healing.

## Combustion



## Pollution Control

## Medical



## Agriculture

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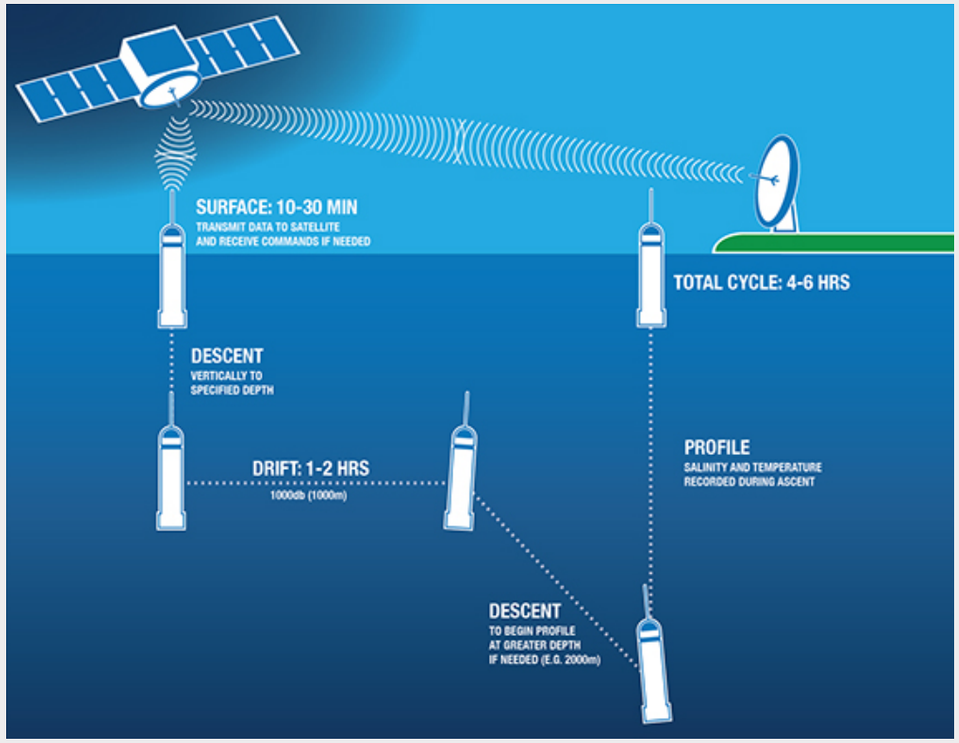
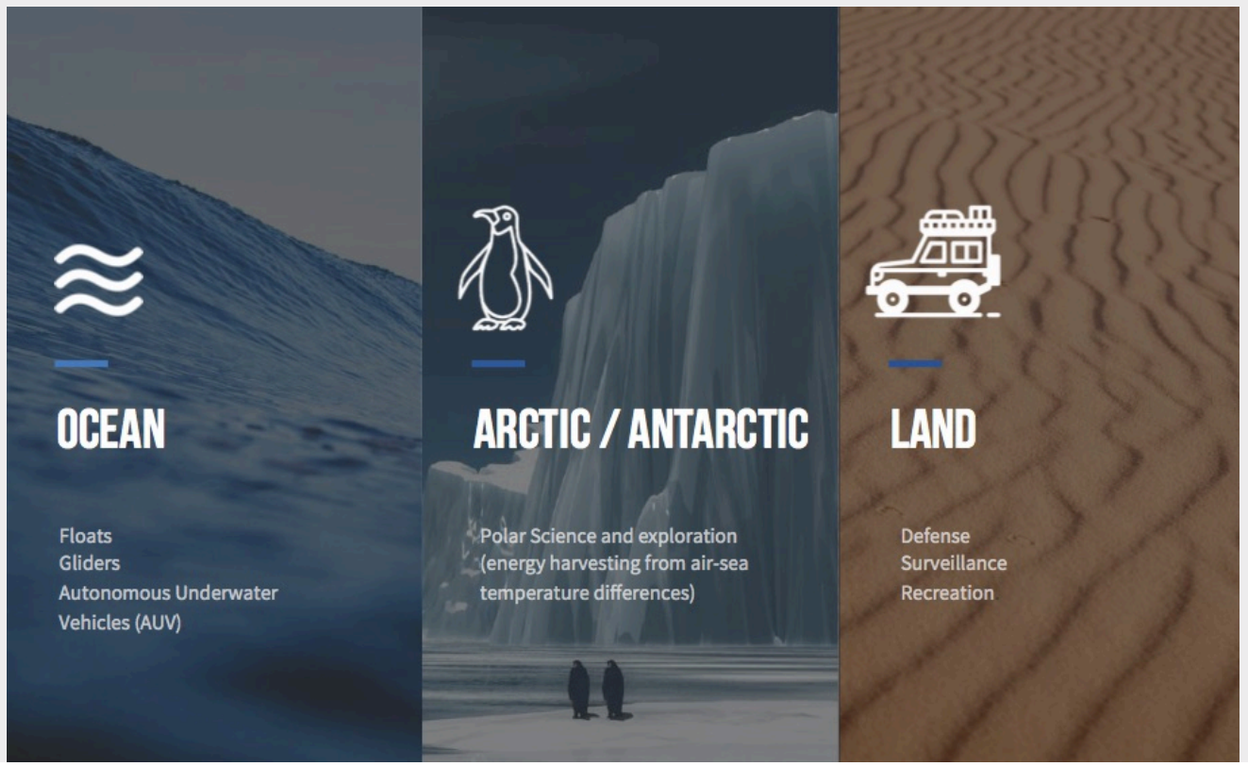
# Seatrec

Electricity derived from temperature differences in the environment.

Batteries for underwater systems with significantly increased capability compared to existing chemical batteries.

Energy harvesting stations provide an underwater power grid for research, industry, and defense.

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# DAQRI

Augmented reality (AR) technology empowers people and remove limits.

DAQRI Smart Helmet™, a powerful AR device built for industrial use.

Intelligent system response:

- data visualization
- thermal vision
- guided work instructions
- remote expert



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# CHALLENGES

## Overcoming Barriers to Accelerate Innovation

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Funding
and Incentives

Market Readiness
and Competences

Reasonable Cost

Demonstration and
Deployment

Regional Clusters
Industry Support

Dealing with Risks
and Their Distribution

Culture
and Procedures

From Lab/Idea to Market
Creating a Business

Regulations
and Policy

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# FUNDING

## Opportunities and Investors' Expectations

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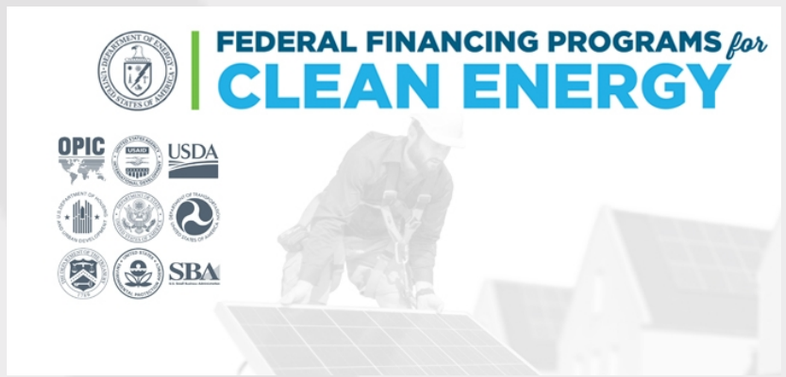




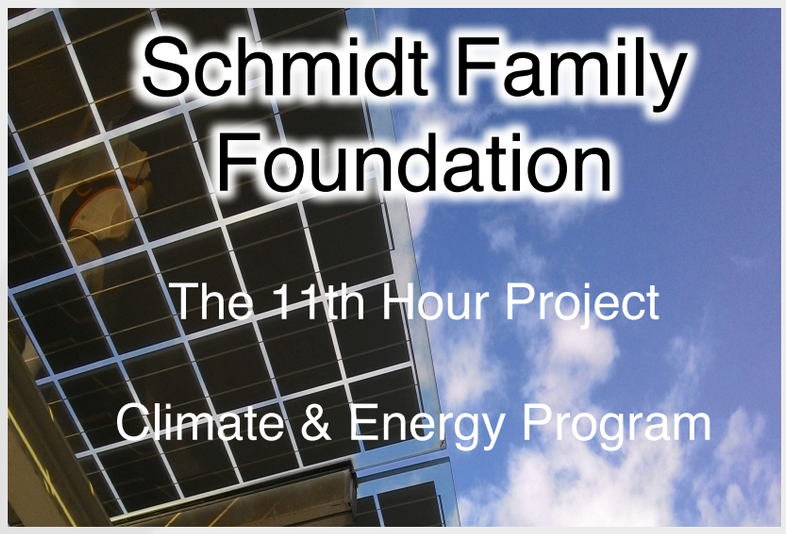



Pasadena Angels
IT'S MORE THAN THE MONEY℠

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Management Team

Market Opportunity

Proof of Concept

Proprietary Assets

Rapid Growth Potential

Market Differentiation

Know Your Customer

Realistic Financials

Exit Strategy

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# DISRUPTION

## Technological and Economic Forces for Market Stimulation

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# TECHNOLOGY TO LOOK OUT FOR


*Source: McKinsey Global Institute analysis*

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# RESILIENCE STRATEGY

## Technology Failure and Recovery

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Management Awareness

Identify Possible Disaster Scenarios

Disaster-Recovery Planning Process

Establish a Planning Group

Perform Risk Assessments, Audits

Establish Network and Applications Priorities

Develop Resiliency and Recovery Strategy

Develop Verification Criteria and Procedures

Implementation and Communication

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DATA COLLECTION AND INTEGRATION

PLANNING AND CAPACITY BUILDING

MARKET-BASED APPROACHES FOR INFRASTRUCTURE AND EFFICIENCY

COMMUNICATING RISK TO CRITICAL INFRASTRUCTURE

COORDINATION OF FEDERAL, STATE AND LOCAL ACTIVITIES

INNOVATIVE WATER USE, EFFICIENCY, AND TECHNOLOGY

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# Discussion

## The role of innovation and transformative technologies in resilient energy systems

Photo: Rawpixel

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# Thank you

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