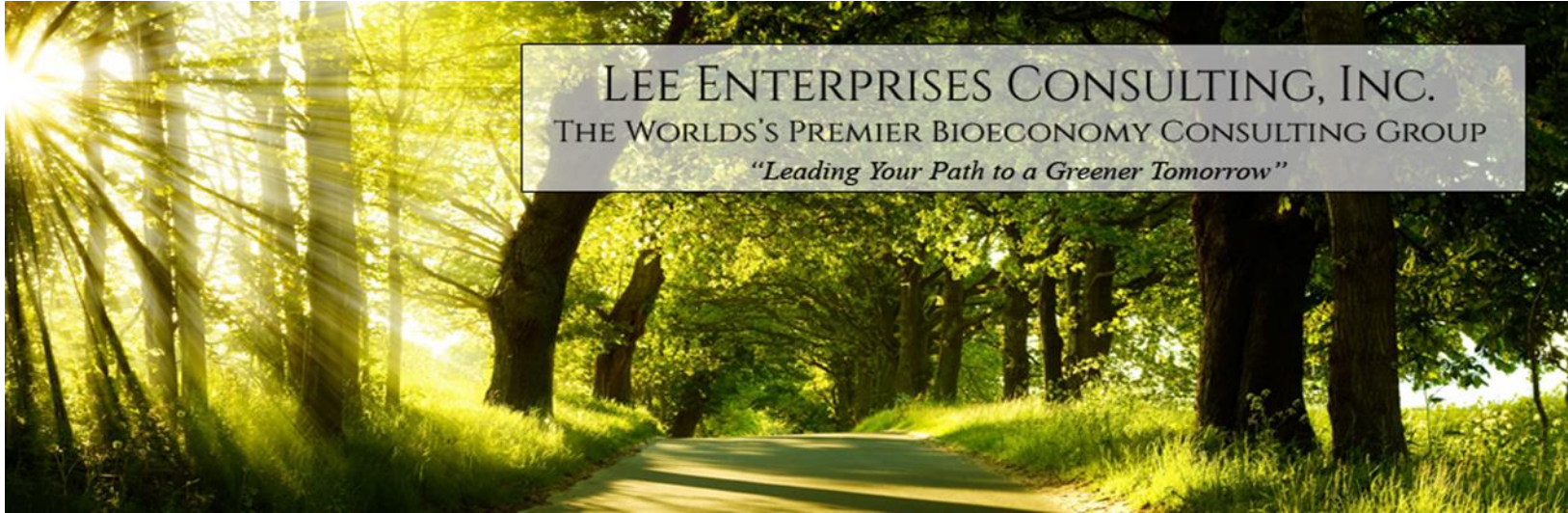


# Due Diligence for Emerging Technologies



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**LEE ENTERPRISES CONSULTING, INC.**  
THE WORLD'S PREMIER BIOECONOMY CONSULTING GROUP  
*"Leading Your Path to a Greener Tomorrow"*

**Expertise: World's largest bioeconomy consulting group - over 100 subject matter experts (SME's)- all areas of the bioeconomy.**

**Approach: Customized interdisciplinary teams to meet exact needs of specific projects.**

**POC: Handle projects with one agreement and single point of contact.**

**Cost Advantage: Single POC = lower administrative costs = lower project cost.**

# “Begin with the End in Mind”

Stephen Covey: 7 Habits of Highly Effective People

What does the commercial product and/or process look like?

- ▶ What is the market demand?
- ▶ What are the unit operations?
- ▶ What commercial type equipment is needed?
- ▶ What Regulatory/Environmental Permits are Required?
- ▶ What Safety Features are Needed?
- ▶ What commercial type inputs are required and available?



# Considerations

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- ▶ How well is your product characterized?
- ▶ Is your process fully defined?
- ▶ Does your product require stabilization?
- ▶ Does your product need/have regulatory approval?
- ▶ Does your product enjoy market pull or is it up against market push?
- ▶ Is your product cost-competitive today by hard data - not wishful speculative pricing?

# Technology Readiness Level

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## ▶ 9 Levels of Technology Readiness

(Humbird)

- ▶ Basic Research/Elevator Pitch
- ▶ Applied Research/Business Plan
- ▶ Proof of Concept/Value Proposition
- ▶ Minimum Viable Process (MVP)
- ▶ Integrated Validation of MVP
- ▶ Integrated Pilot Operations
- ▶ Fully Integrated Continuous Pilot Operations
- ▶ Precommercial Demonstration Operations
- ▶ Full Scale Commercial Operations

## ▶ Where are you?

# Risk Mitigation

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## ▶ What are your greatest risks?

- ▶ Product Market?
- ▶ Product Efficacy?
- ▶ Process Scale?
- ▶ Equipment Scale?
- ▶ IP Strategy?
- ▶ Regulatory Approval?
- ▶ Financing?

## ▶ Get Good Advice

- ▶ Internal
- ▶ External

## ▶ Prepare

- ▶ Expect the Unexpected
- ▶ Make Contingency Plans
- ▶ It will take longer than you think
- ▶ It will cost more than you think

# Market Pull, Not Technology Push

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- ▶ Does an existing market really need your product?
- ▶ What is the size of the market?
- ▶ What are the price points of the market?
- ▶ Who is the competition?

# Data Driven Decisions – Not Emotions

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- ▶ **Ask/Answer the Right Questions Early**
  - ▶ Technical
  - ▶ Financial
- ▶ **Identify Minimum Performance Targets**
- ▶ **Establish Preliminary TEA Model**
- ▶ **Establish Realistic Timeline - Avoid Shortcuts**
- ▶ **Establish Fully Integrated Performance Runs**
- ▶ **Conduct Mandatory Stage-Gate Reviews**
- ▶ **Avoid Emotional Decisions**



# Who Is On Your Team?

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## ▶ Experienced: Been There, Done That

- ▶ Most have conducted Discovery and Early Applied R&D
- ▶ Fewer have conducted Commercially-Focused PDU scale development
- ▶ Fewer yet have conducted large fully integrated pilot/demo development
- ▶ Even fewer have run commercial operations

## ▶ Internal

- ▶ Technical
- ▶ Business

## ▶ External

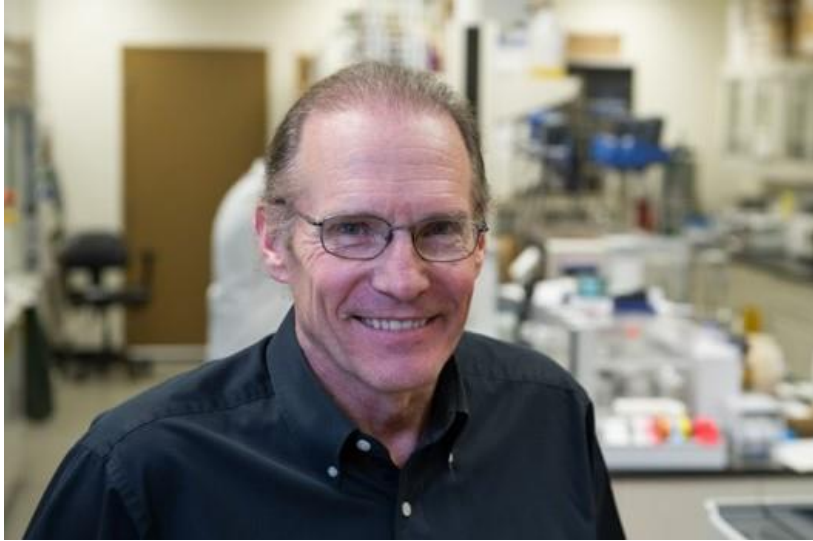
- ▶ Independent Third Parties
- ▶ Fill the Gaps

# Conclusions

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- ▶ **Begin with the End in Mind**
- ▶ **Get Good Advice - Internal and External**
- ▶ **Expect and Prepare for the Unexpected**
- ▶ **Make Data-Driven, NOT Emotional Decisions**
- ▶ **Establish a Fully Integrated Pilot Plant with Commercial Size Components**
- ▶ **Shortcuts are often Illusions of the Solutions They Pretend To Be**
- ▶ **Conduct Successful, 1,000-Hour (minimum), Fully Integrated Performance Runs**
- ▶ **Demonstrate Unproven Unit Operations at 1/10 Scale of Minimum Commercial Scale**

# Thank You!



**Accredited  
Member**



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**Consulting/advisory services to developers, companies, and investors in the US and internationally**