



GOPHURRS T2M

Christian Vandervort, PhD, PE

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GOPHURRS
Kickoff Meeting
May 2nd, 2024
Charlotte, NC

T2M: Preparing project teams for commercialization



Scope

Support creation of highly innovative, commercially-relevant programs



Advise

Support project teams with skills & knowledge to align technology with market needs



Manage

Manage project teams' T2M efforts through T2M plans and jointly developed milestones



Partnerships

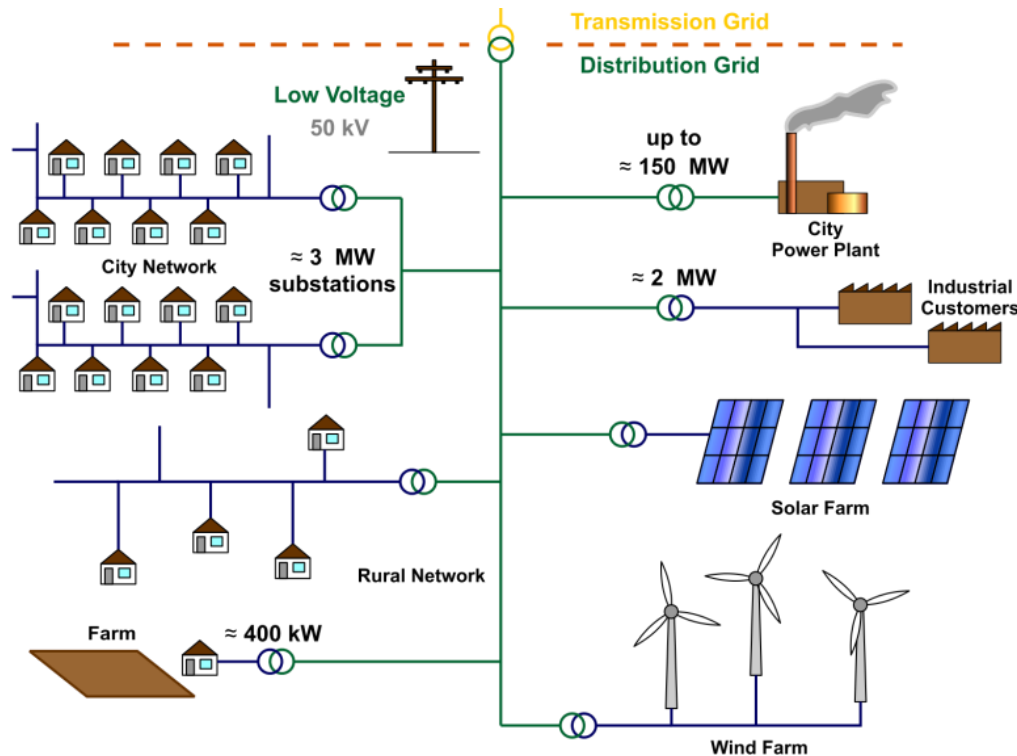
Engage third-party investors and partners to support technology development towards the market

T2M Perspective on GOPHURRS

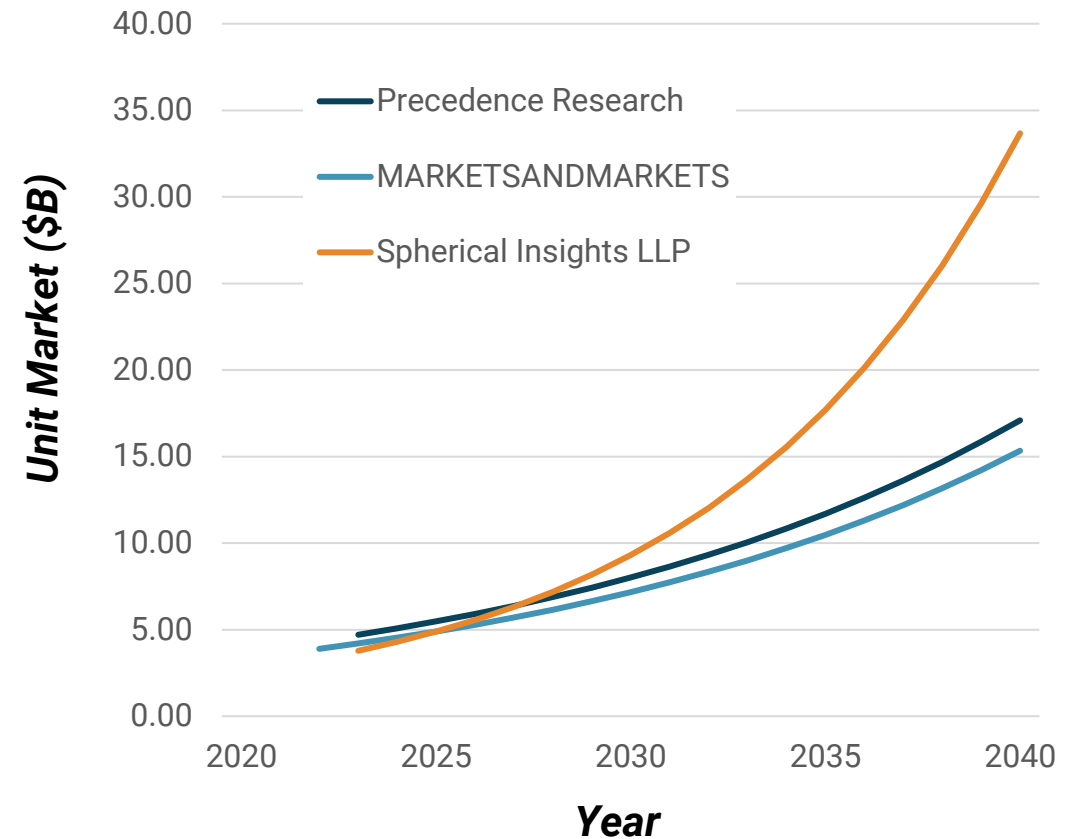
- Serving an essential need for expanding electric power distribution with high reliability and resilience
- Demonstration and piloting are essential, outages due to unproven technology are unacceptable
- Minimum viable product: region, project category, scope, risk mitigation, ...
- Multiple business modes: Sell vs lease vs self-deploy
- Significant opportunities in adjacent infrastructure (water, sewer, broadband, natural gas pipelines, ...) and integration

Electric power distribution unit market projections @ cst CAGR

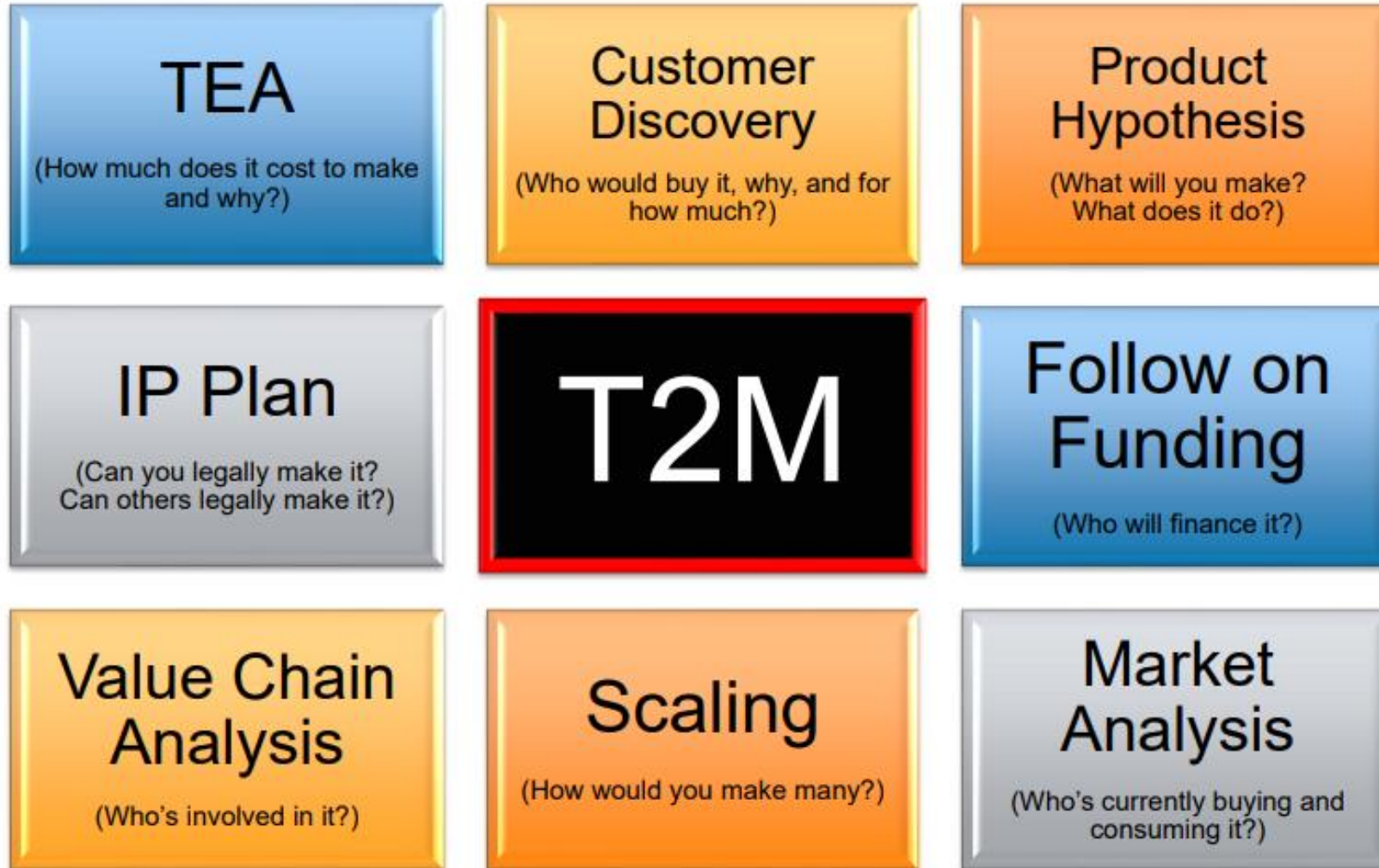
Power distribution is essential element of our societal infrastructure, drive for sustainability further increases the importance.



Electric Power Distribution



An evidence-based approach



Tech-to-Market Plan

Product Hypothesis

Intellectual Property Strategy

Manufacturing and Scalability

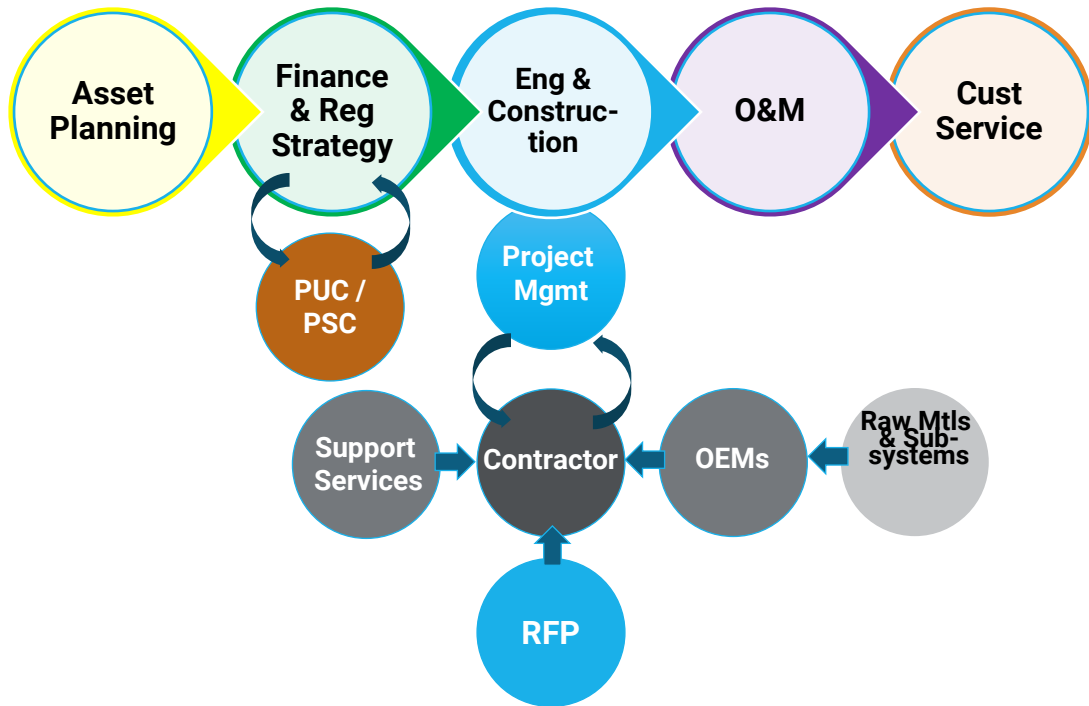
Value Chain Analysis



arpa·e

TECHNOLOGY TO MARKET PLAN
Template and Instructions

Utility asset deployment value chain



Core Market Participants

- Debt & equity capital markets
- Utilities (IOUs, munis, coops)
- State & federal regulators
- EPCs / contractors
- OEMs
- Interconnection partners
- End users (commercial, industrial, residential)

Additional Stakeholders

- Support software (ERP, asset mgmt, control & monitoring, cyber, proj mgmt, etc.)
- Subsystems vendors & materials supply chain
- Strategy, regulatory & environmental consultants
- DERs & microgrids
- NGOs & community advocates

~ 1 million American jobs in the T&D industry today^[1]

Techno-economic analysis: Understanding the economics

- ▶ **More than a Cost Model**, not a business plan
- ▶ Inherently challenging and interdisciplinary
- ▶ Low Fidelity at Start of Project → Increasing Fidelity as Project Advances

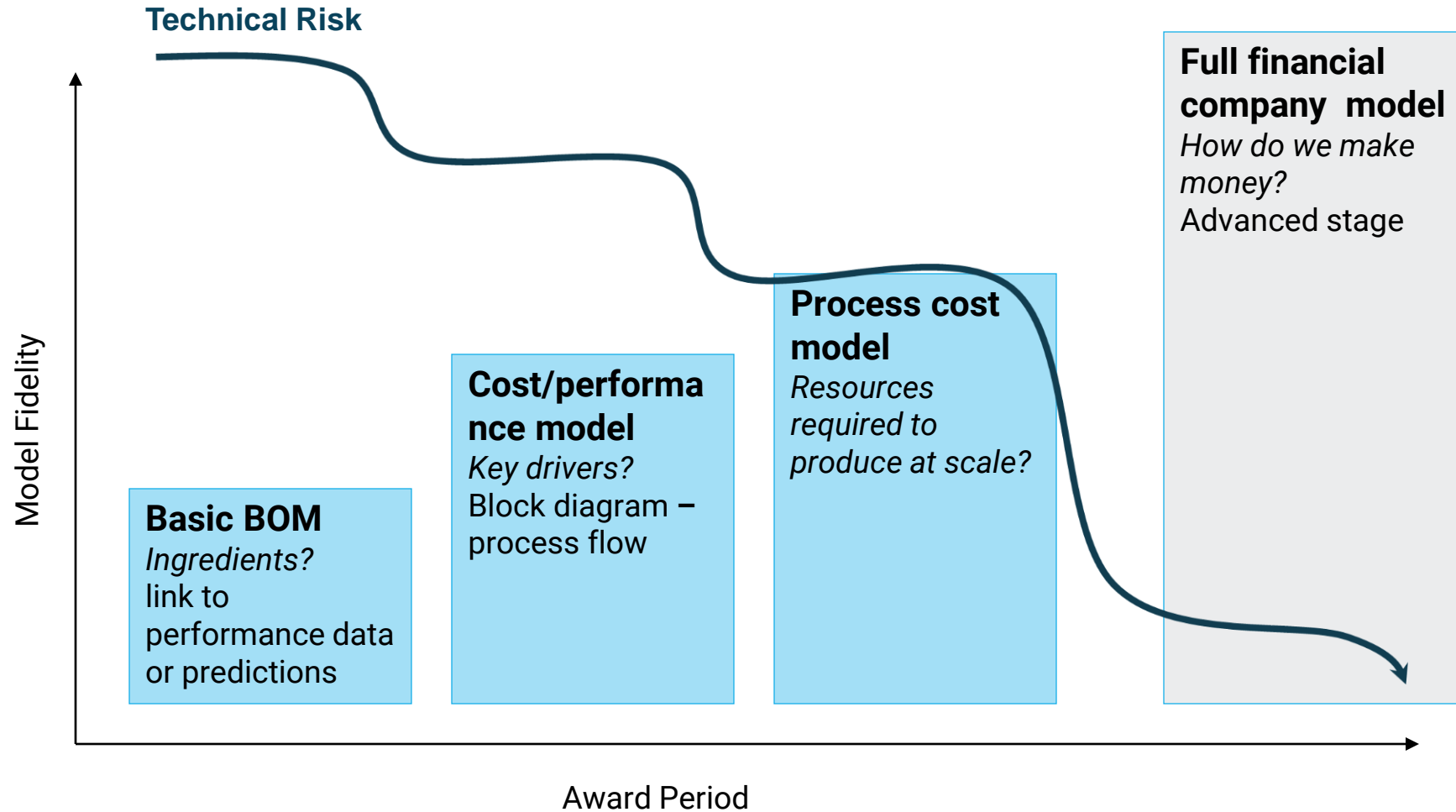


T-E Analysis
Cost

- Establish **theoretical limits**
- Identify Most **Valuable Improvements**
- **Inform** Potential **Trade-offs**, Targets, and Metrics
- Ultimately...Understand the **Minimum Viable Pricing**
- Starting point based upon ... **“Value Pricing”**

Identify specific technology improvements that affect major cost drivers
Determine economic viability of end product

TEA evolution



Cost spreadsheet as preliminary economic model

- ▶ Modeled after REPAIR
- ▶ Establishes baseline cost
- ▶ ‘New cost’ updated every quarter by each team
- ▶ Shows the pathway to 50% cost reduction
- ▶ Forces teams to talk to their potential customers and stakeholders and document the sources of cost information for accuracy
- ▶ May not be highly accurate but utilities can easily correct errors and use it

	A	B	C	D	E	F	G	H
1	Input Parameters	Units	Value	Comment				
2	Installed Distance	miles	5					
3	Installed Distance	km	8					
4	Project Duration	months	18					
5								
6	1. Consultant & Contractor Costs	Units	Value	Comment				
7	Project Management	(\$)	\$ 360,000.00					
8	Site preparation (vegetation control)	(\$)	\$ 360,000.00					
9	Excavation	(\$)	\$ 360,000.00					
10	Utility day-lighting (pot holing, underground survey/mapping)	(\$)	\$ 360,000.00					
11	Backfilling	(\$)	\$ 360,000.00					
12	Repaving	(\$)	\$ 360,000.00					
13	Restoring landscapes (vegetation)	(\$)	\$ 360,000.00					
14	Install conduits	(\$)	\$ 360,000.00					
15	Install duct banks (if needed)	(\$)	\$ 360,000.00					
16	Install access shafts	(\$)	\$ 360,000.00					
17	Install junction boxes	(\$)	\$ 360,000.00					
18	Install vaults	(\$)	\$ 360,000.00					
19	Install pads for pad-mount equipment	(\$)	\$ 360,000.00					
20	Install cables	(\$)	\$ 360,000.00					
21	Install joints (splice, termination, elbow)	(\$)	\$ 360,000.00					
22	Transportation	(\$)	\$ 360,000.00					
23	Damages and repairs	(\$)	\$ 360,000.00					
24	Total Consultant & Contractor Cost	(\$)	\$ 6,120,000.00					
25								
26	2. Utility Labor Costs	Units	Value	Comment				
27	Project Management	(\$)	\$ 360,000.00					
28	Utility installations	(\$)	\$ 360,000.00					
29	Total Consultant & Contractor Cost	(\$/km)	\$ 720,000.00					
30								
31	3. Material & Material Transport Costs	Units	Value	Comment				
32	Cable	(\$/km)	\$ 340,000.00					
33	Conduit	(\$/km)	\$ 340,000.00					
34	Duct Banks (if needed)	(\$/km)	\$ 340,000.00					
35	Access shafts	(\$/km)	\$ 340,000.00					
36	Junction boxes	(\$/km)	\$ 340,000.00					
37	Vaults	(\$/km)	\$ 340,000.00					
38	Equipment mounting pads	(\$/km)	\$ 340,000.00					
39	Terminations	(\$/km)	\$ 340,000.00					
40	Instrumentation	(\$/km)	\$ 340,000.00					
41	Materials Transport & Handling	(\$/km)	\$ 340,000.00					
42	Consumables	(\$/km)	\$ 340,000.00					
43	Total Material Cost	(\$/km)	\$ 3,740,000.00					
44								
45	4. Capital Equipment Costs							
46		Units	Capital Equipment #1: Mapping & Survey	Capital Equipment #2: Drilling	Capital Equipment #3: Restoration Service	Capital Equipment #4: (As needed)	Cost modeling tool can be expanded for additional capital equipment costs	
47	CAPEX	(\$)	\$ 1,500,000.00	\$ 3,000,000.00	\$ 1,000,000.00	\$ -		
48	Annual return on CAPEX	(%)	20%	20%	20%	20%		
49	Useful life	(yrs)	5	5	5	5		
50	Annual amortized cost recovery for tool CAPEX, including Annual return on CAPEX	(\$)	\$ 501,569.55	\$ 1,003,139.11	\$ 334,379.70	\$ -		
51	Capital Equipment Maintenance	% of CAPEX	6%	6%	6%	6%		
52	Annual Capital Equipment Maintenance Cost	(\$)	\$ 90,000.00	\$ 180,000.00	\$ 60,000.00	\$ -		
53	Monthly Capital Equipment Maintenance Cost	(\$)	\$ 7,500.00	\$ 15,000.00	\$ 5,000.00	\$ -		
54	Project CAPEX (amortized cost recovery + capital equipment maintenance)	(\$)	\$ 135,000.00	\$ 270,000.00	\$ 90,000.00	\$ -		
55	Total CAPEX (Categories # 1 - 4)	(\$)	\$ 495,000.00					
56								
57	5. Other Costs							
58	AFUDC & Interest	(\$)	\$ 360,000.00					
59	Equipment rental	(\$)	\$ 360,000.00					
60	Insurance	(\$)	\$ 360,000.00					
61	Total Consultant & Contractor Cost	(\$/km)	\$ 1,080,000.00					

INSTRUCTIONS:	This worksheet is intended to provide guidance. Green cells inputs made by Applicants.	
Results Summary	Units	Value
Total Project Cost	(\$)	\$ 12,155,000
Total cost	(\$/mile)	\$ 2,431,000
Total cost	(\$/km)	\$ 1,509,651

Creating a business plan

Guiding document describing a company's core business activities and how it plans to achieve its goals.
Consistently updated.

Concept Analysis

- Exploring entrepreneurship
- Defining vision/mission
- Defining target market
- Conducting market research and analysis
- Testing business concept
- Regulations & permitting
- Finance, Insurance, & Warranties
- Public relations
- Competition (International)

Business Planning

- Entering market
- Financial planning
- Building/compensating team
- Protecting business and IP
- Identifying funding and working with investors
- Managing and operating business
- Gov't relations
- Communications

- ▶ Fantastic resource – FastTrac Entrepreneur Manual by Kauffman Foundation

Building a solid team is crucial!

Management

Boards/advisors

Recruitment

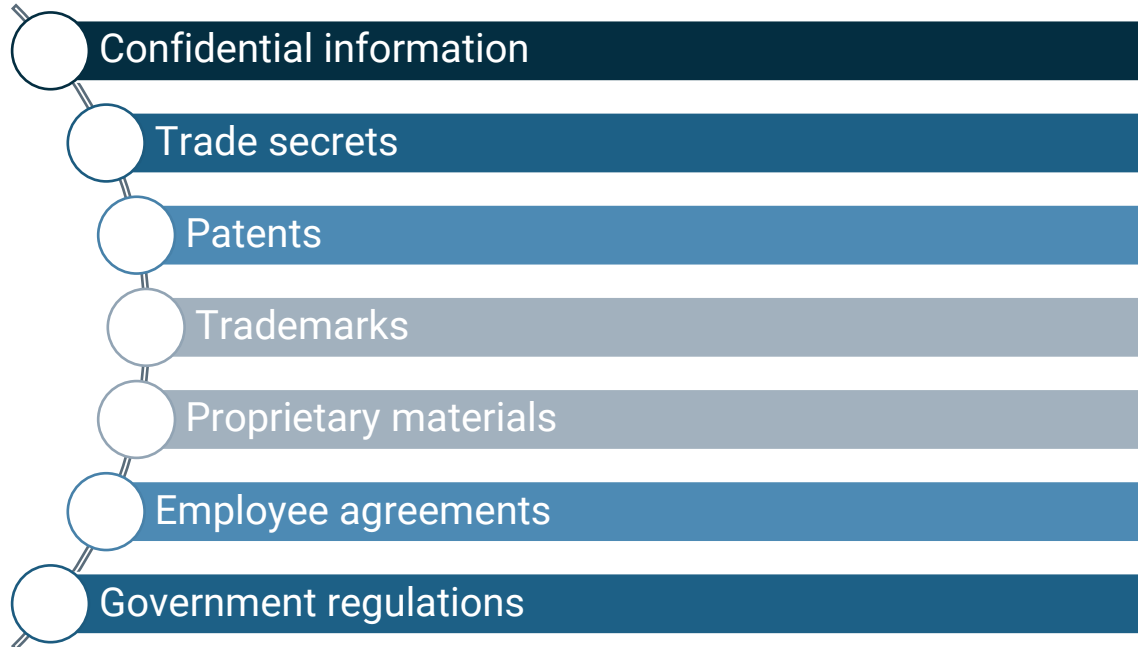
Growing pitfalls

Culture

Outsourcing



Protect my IP (*internally and externally*)



ARPA-E can provide funds for IP protection

❖ Use institution's tech. transfer office or identify legal counsel

Finance Models



Fund Raising: When is Capital Needed?

H/W; Manuf.

\$100K

\$1000K

\$10M

\$100M



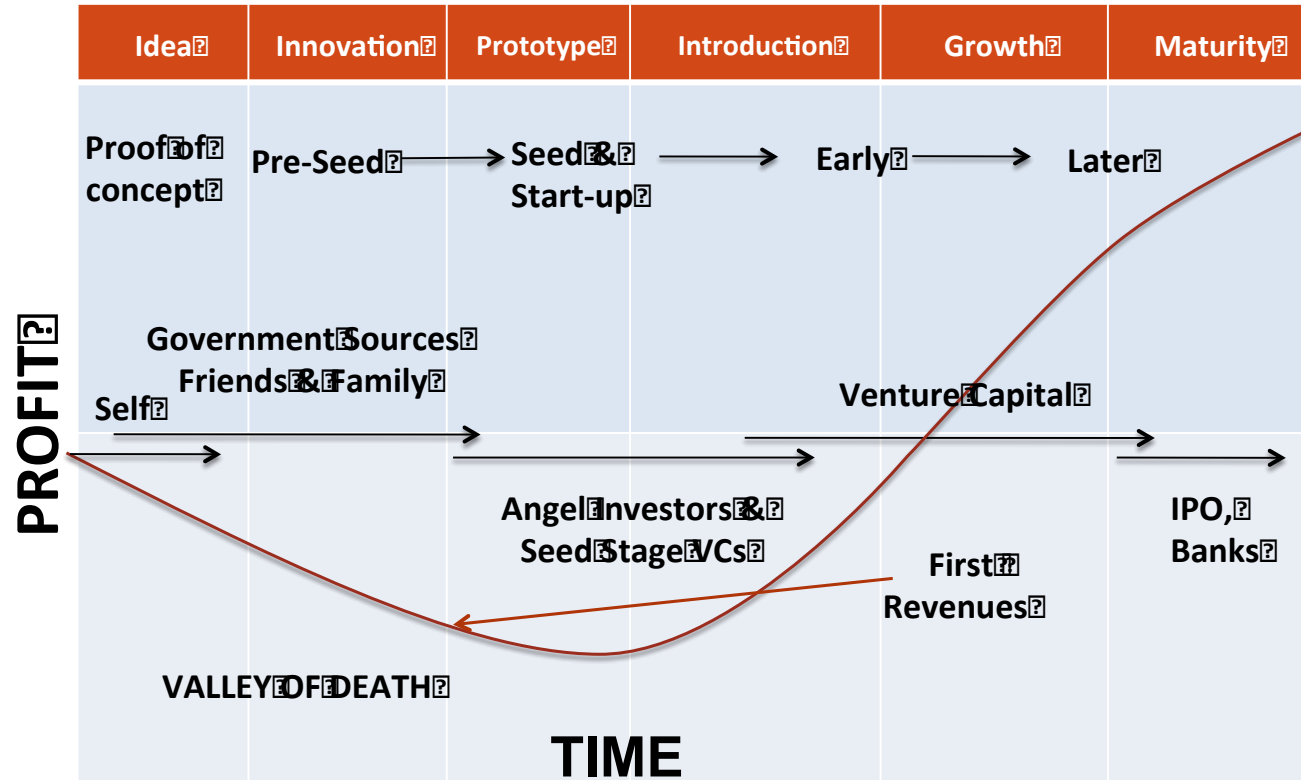
IT; Service

\$10K

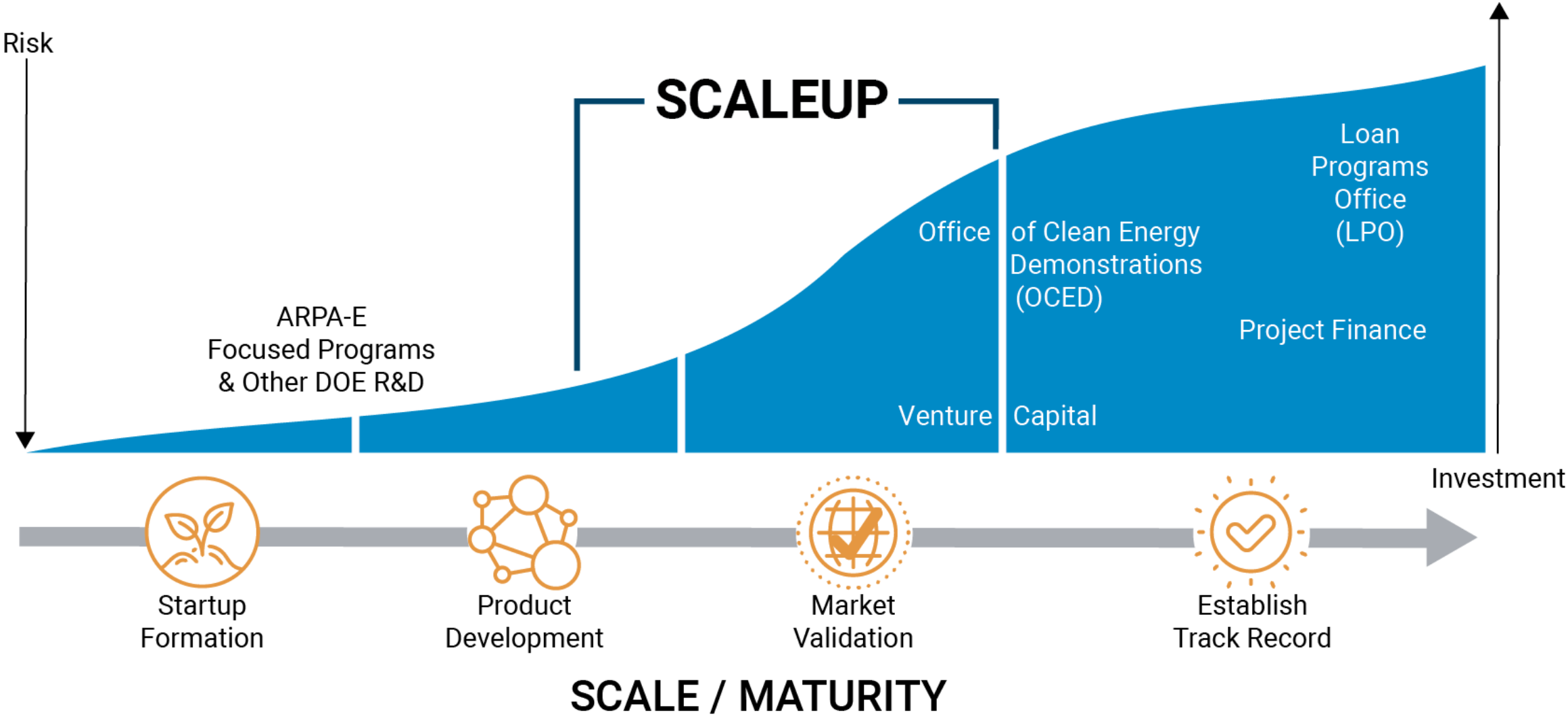
\$100K

\$1M

\$10M



ARPA-E SCALEUP





SCALEUP

Seeding Critical Advances for Leading Energy technologies with Untapped Potential

Supports previously funded ARPA-E technologies to commercial viability

*

Enables further technology de-risking of pre-production prototypes

*

Encourages small business, company, and industry participation

*

SCALEUP 2019

9 Awardees – \$70 million

*

SCALEUP 2021

8 awardees - \$100M available

If it works...

will it matter?

Q & A



U.S. DEPARTMENT OF
ENERGY

Team Logo

<Presenter Name>

<email>