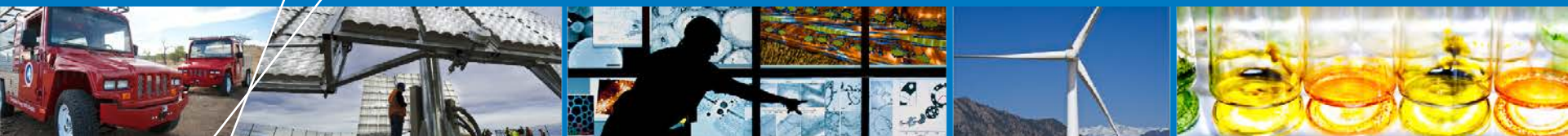


Getting from Goals to Projects in the Ground



Renewable Energy Roundtable

Bob Springer

March 27, 2012

NREL/PR-7A40-54591

The Challenge



```
graph LR; A[Components identify top project (s)] --> B[Receive technical assistance from NREL]; B --> C[Completed project!]
```

Components
identify top
project (s)

Receive
technical
assistance from
NREL

Completed
project!

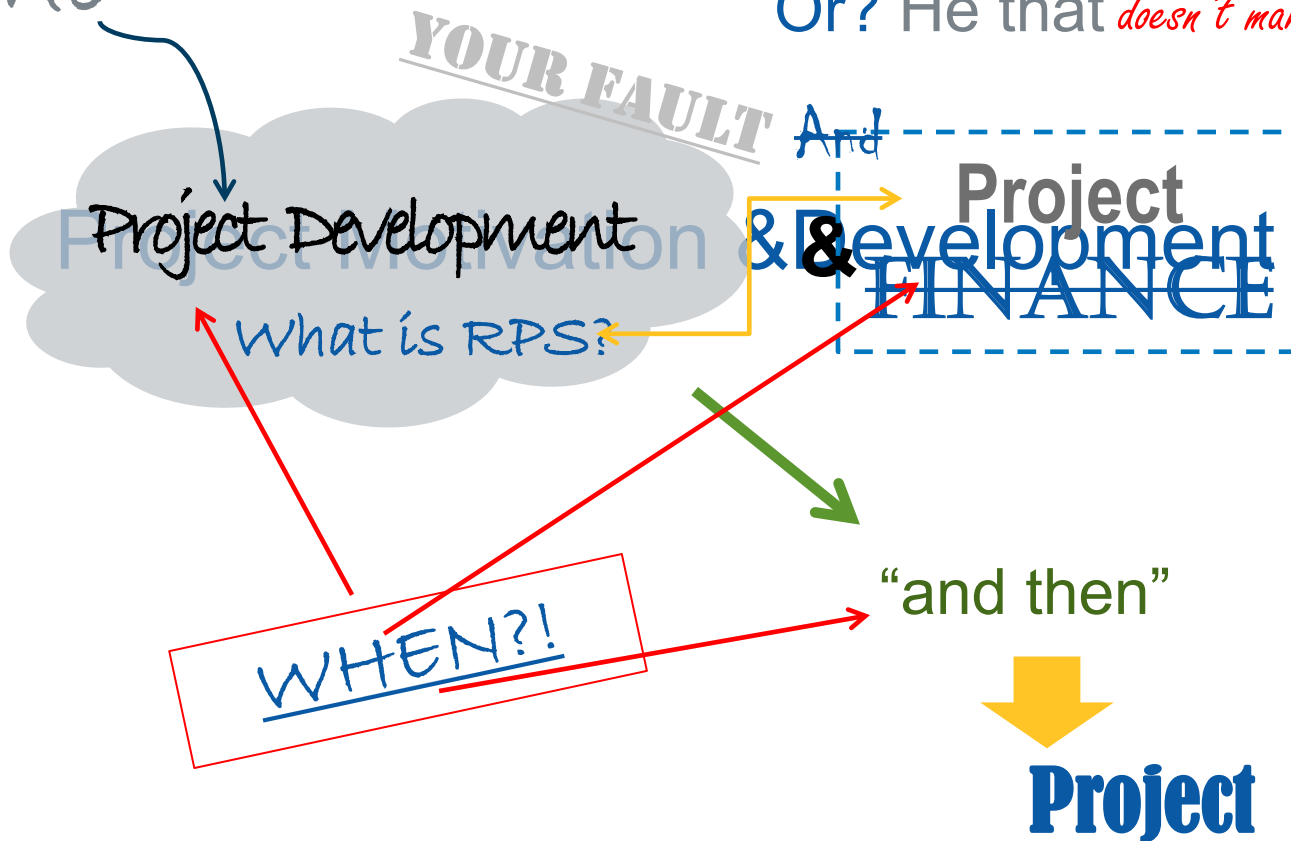
We will introduce a methodology which serves the intent of actually building “the project” at the end of the day, and driving to that conclusion while managing risk.

Project Motivation & Development

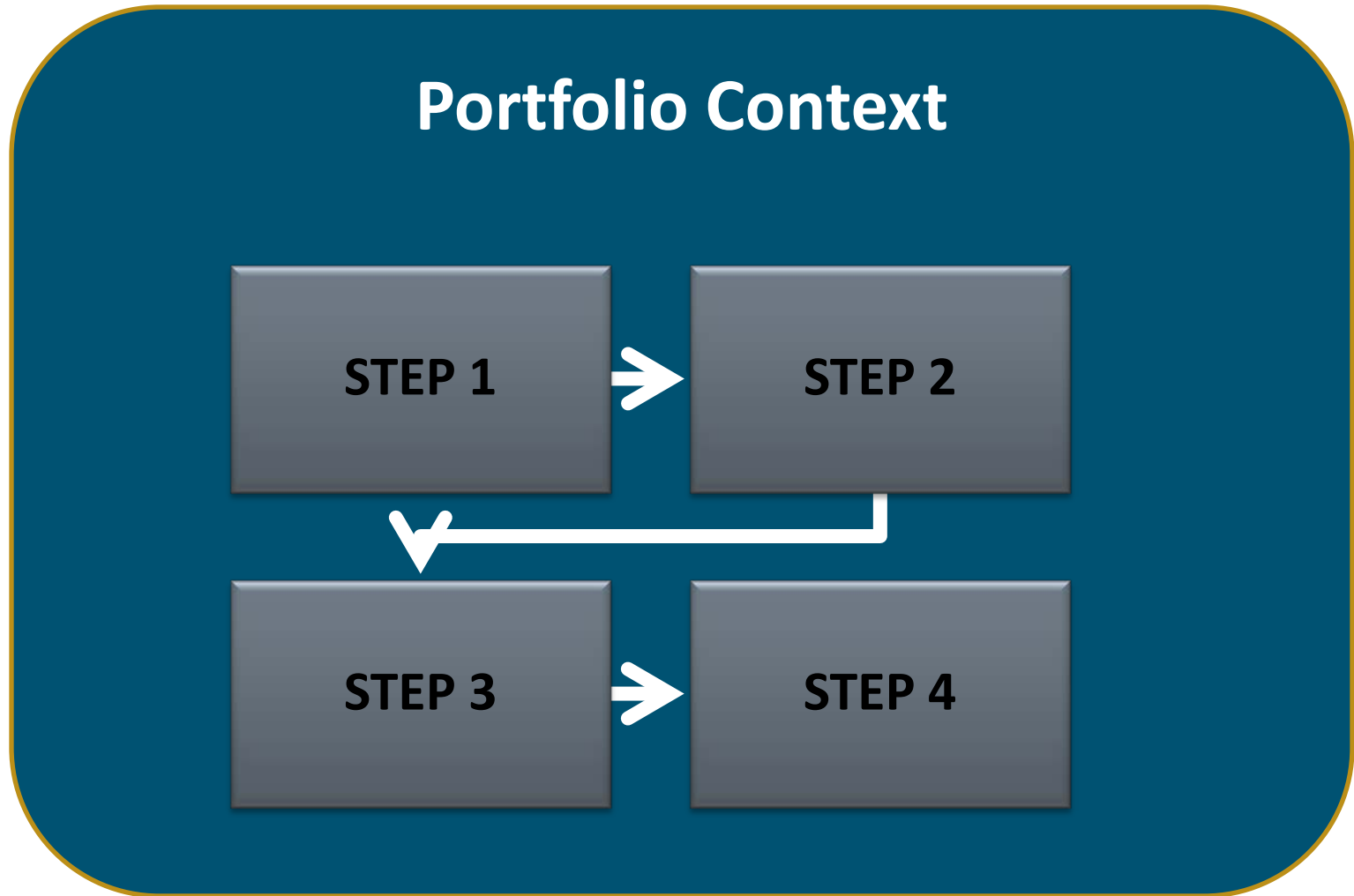
Who?!

Me?

Or? He that *doesn't make sense!*



Portfolio Context



Key Concepts

- **Project Context & Motivation**

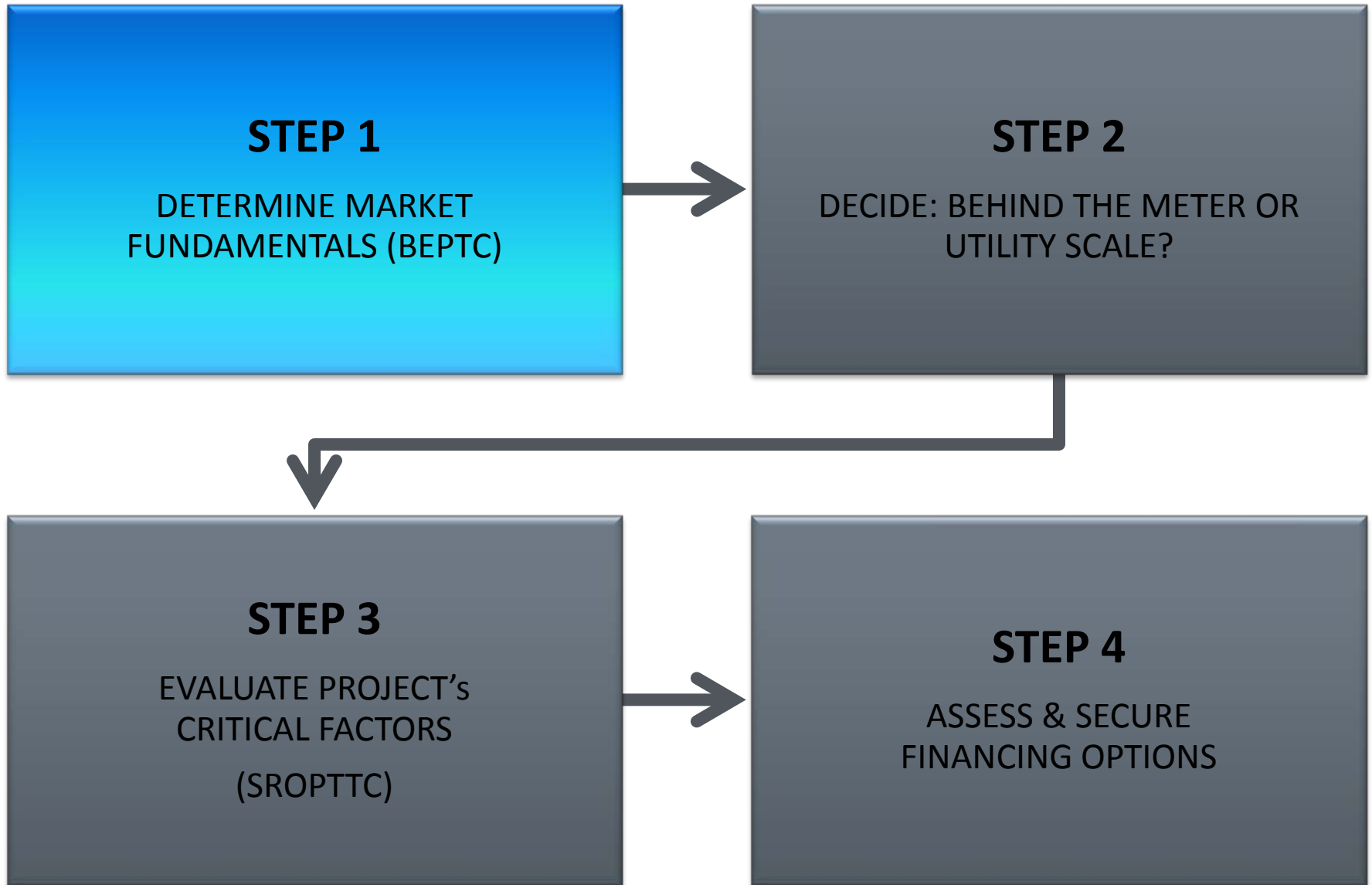
- What are the basics of your energy environment (e.g. utility relationship, governance structure, energy sources and costs, key decision makers)?
- Is the project viable, are you motivated?

- **Project Development Framework**

- Overall process environment – situational awareness
- Framework of information management – SROPTTC
- Process of incremental investment seeking fatal flaws – Risk Management
- Tools: Pro formas and project checklists.

- Use this process to organize the project and determine viability.
- Bankable projects can move on to determine the potential for different financing options.

Project Development & Finance Road Map

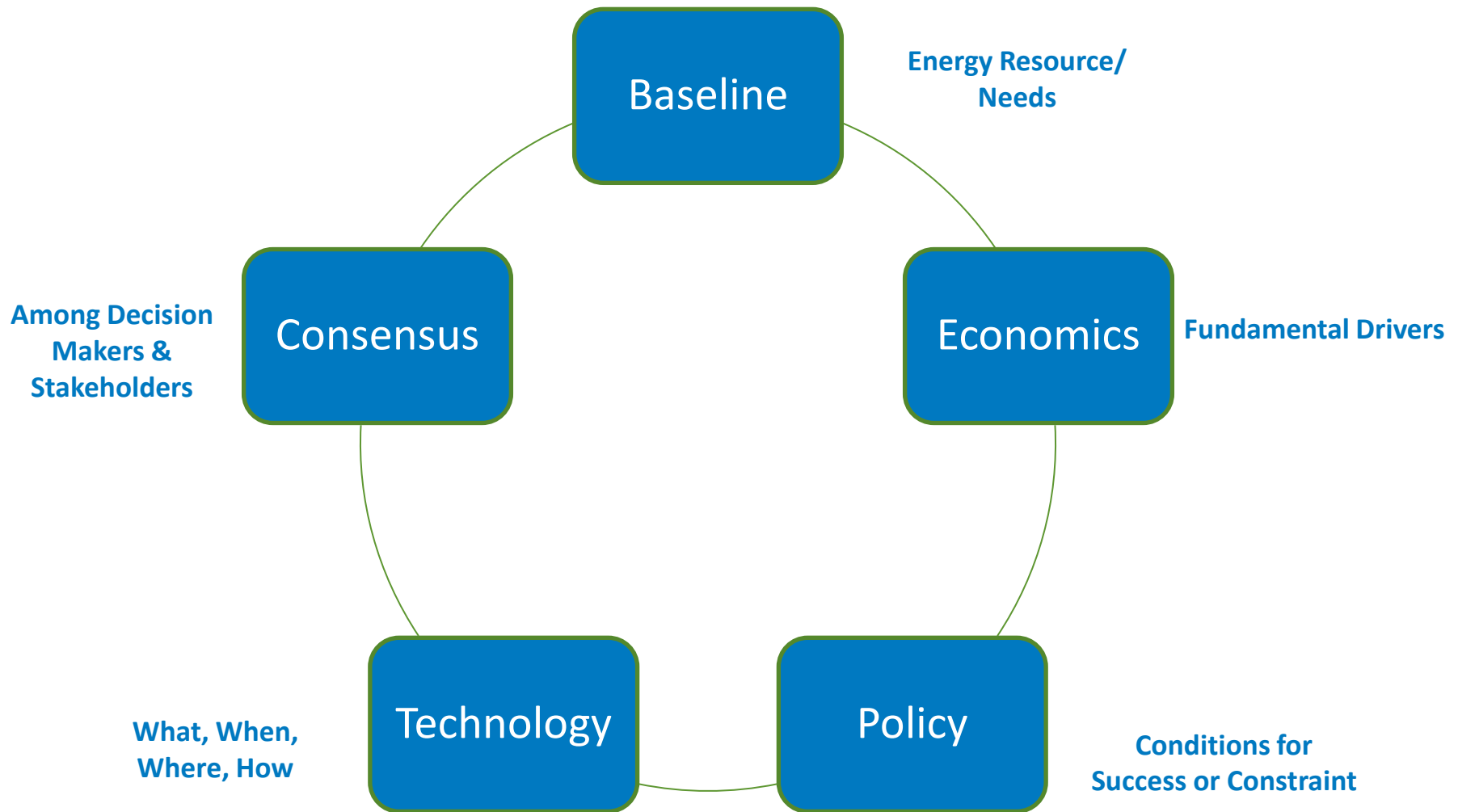


Project Fundamentals

Baseline	Economics	Policy	Technology	Consensus
Energy Resource/Needs	Fundamental Drivers	Conditions for Success or Constraint	What, When, Where, How	Among Decision Makers & Stakeholders
<u>Current Use</u> Electricity Fuels <u>Future Needs</u>	Energy cost projections Ratepayer perspective Social: costs/benefits (jobs) Environmental: costs/benefits	<u>Types:</u> Regulatory Government Internal <u>Topics:</u> Energy Standards Economic Development Interconnection Transmission access	Tested/Viable Appropriate for location Access to resource Volume of resource Integration concerns	Stakeholder identification Community strategies Identify key decision makers

Establish Context and Motivation

Process for Strong Motivation



Key Concept: Fundamentals = Motivation

- Developing project concepts into reality requires a strong foundation of drivers to overcome challenges, uncertainty, and maintain forward momentum – we call this project motivation.
- A “motivated project” wants to exist on the fundamentals.
- To manage risk in early stage project development, motivation is first established in a market analysis.

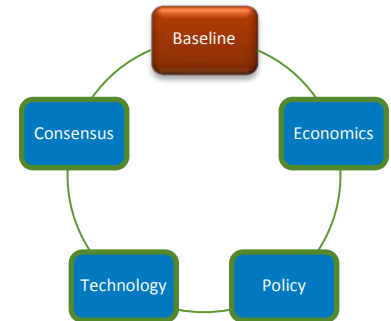
Baseline

- **Purpose**

- Establishes the key driver or characteristic of the local energy market
- A good example is something that defines the competition and is the trade-off with renewables
- Example: Hawaii and petroleum

- **Considerations**

- Energy sources and fuels
- Market dynamics; growth, contraction
- Import or export environment



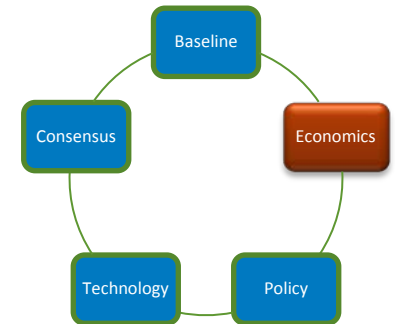
Economics

- **Purpose**

- Economic trade-off
- Competition and market for energy
- Establish go-no go; acknowledge the environment and make plan to mitigate economic challenges

- **Considerations**

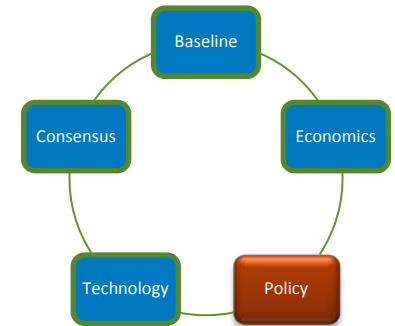
- Retail vs. wholesale rate(s)
- Future cost growth of grid power
- Fuels and inputs, environmental policy, growth



Policy

- **Purpose**

- Often the pathway to executing project
- Identify supporting policies
- Taking steps to mitigate, remove, or deal with impeding policies to create the conditions for success are imperative



- **Considerations**

- Government (Fed/state/local)
- Internal (to your organization)
- Market (regulation, market structure)



Photo by Warren Gretz, NREL/PIX 11732

Technology

- **Purpose**

- Preliminary resource assessment

- **Considerations**

- Assessing commercial technologies
 - Reliability
 - Bankability

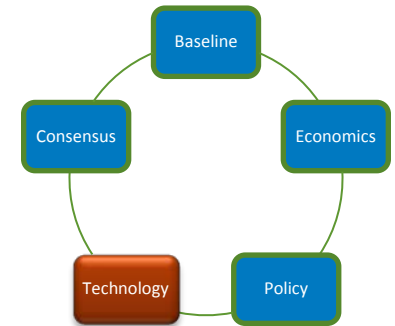


Photo from Alstom 2010, NREL/PIX 18207

Consensus

- **Purpose**

- Once factual data exists, share it!
- Use the framework to establish consensus
- This support will be needed later; looking for commitment based on the facts

- **Considerations**

- Stakeholders
- Patience – don't move ahead without this
- If unable to get it, should you go forward?

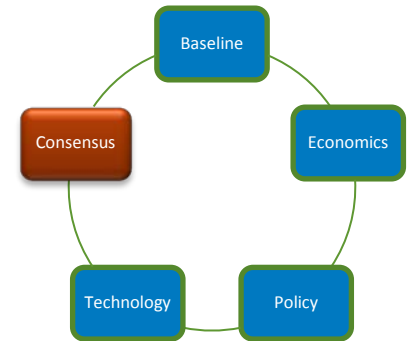


Photo by Patrick Corkery, NREL/PIX 15919

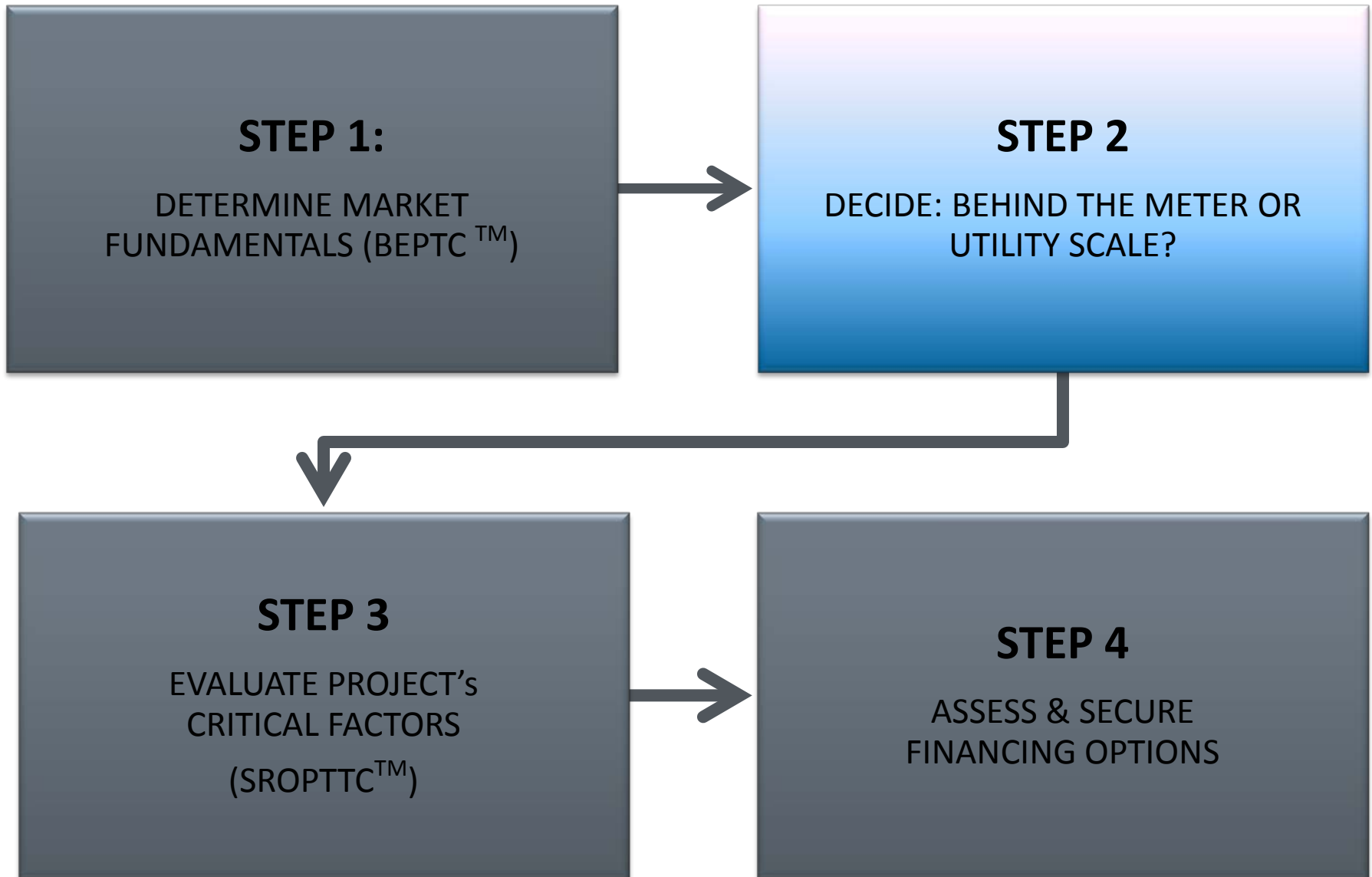
Summary of Market Fundamentals

Key Elements of Market Fundamentals

- Baseline: existing energy “reality”
- Economics: fundamental driver(s)
- Policy: create conditions for success
- Technology: what, when, where, how many?
- Consensus: establish, advance, defend

Establish and maintain motivation using this framework as a guide – “BEPTC™”

Project Development & Finance Road Map



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Step 2: Directional Decision

Two Paths Forward:

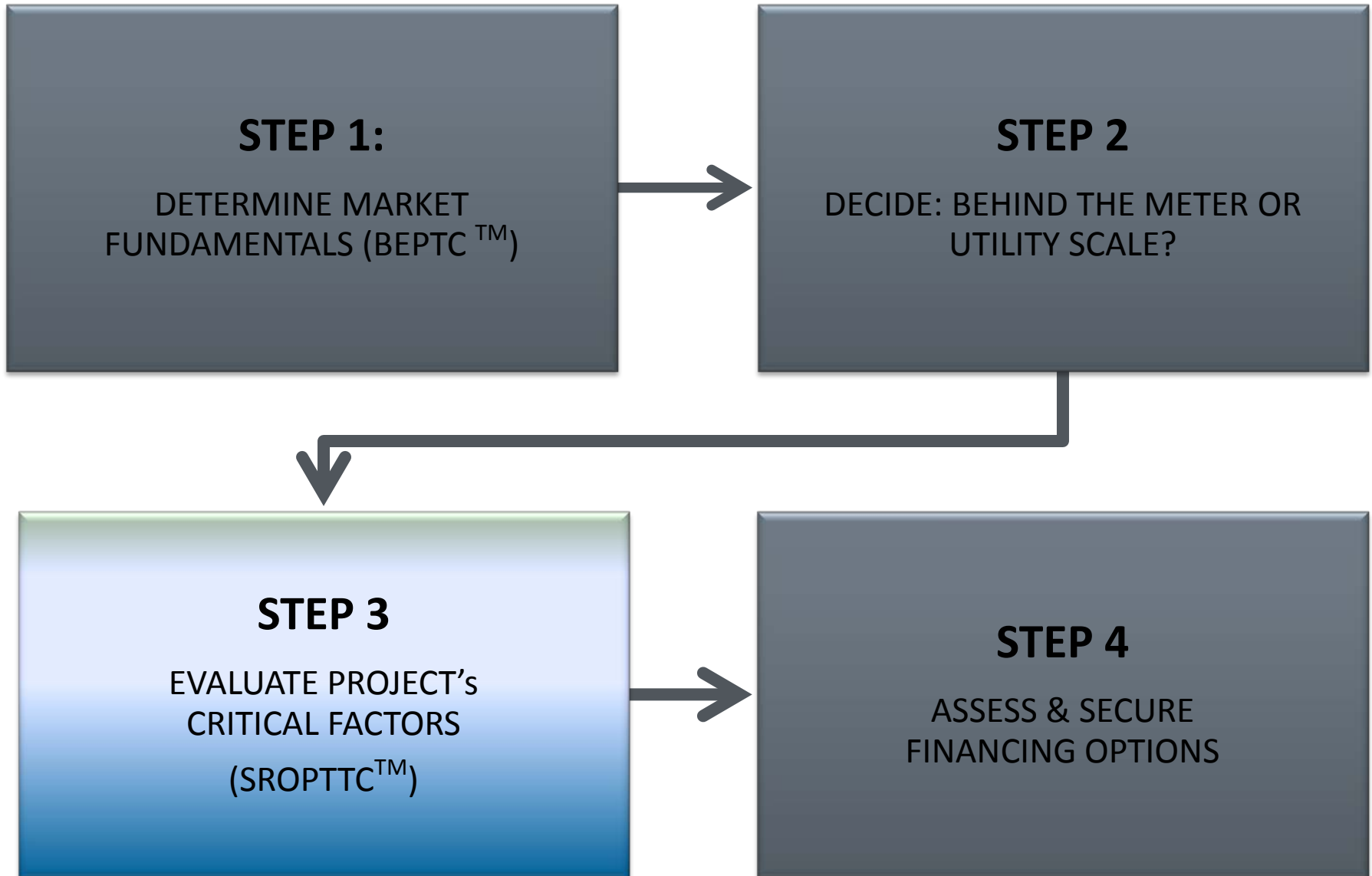
THIRD PARTY PARTNERSHIP **Utility Scale – Sell to Utility**

- Is access available to get energy to the market? (e.g. Transmission) - Interconnection/Regulation); Legal Environment. If yes, does the market have an appetite? At what price? Is that economic for project? YES / NO?

DIRECT OWNERSHIP **Behind the Meter: facility** **buys output**

- If not commercial, will community scale work? What is interconnection/regulatory environment? Is behind the meter allowed? How? FIT, Net Metering, Other? Is it economic?

Project Development & Finance Road Map



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Risk Mitigation

- Project Development is a risky endeavor
- Successful risk management and effective capital budgeting are two of the factors associated with rewarding developers
- Renewable Energy Project development risk include:
 - Federal policy uncertainty
- Inform about some risks and providing risk management tool/process
- Will instruct on how these tools have been put in practice that is relevant for Indian Country

\$

Development Risk Capital

Project Finance
(Construction)

Asset Finance

Time

Unknowns

Risk

Site

Resource

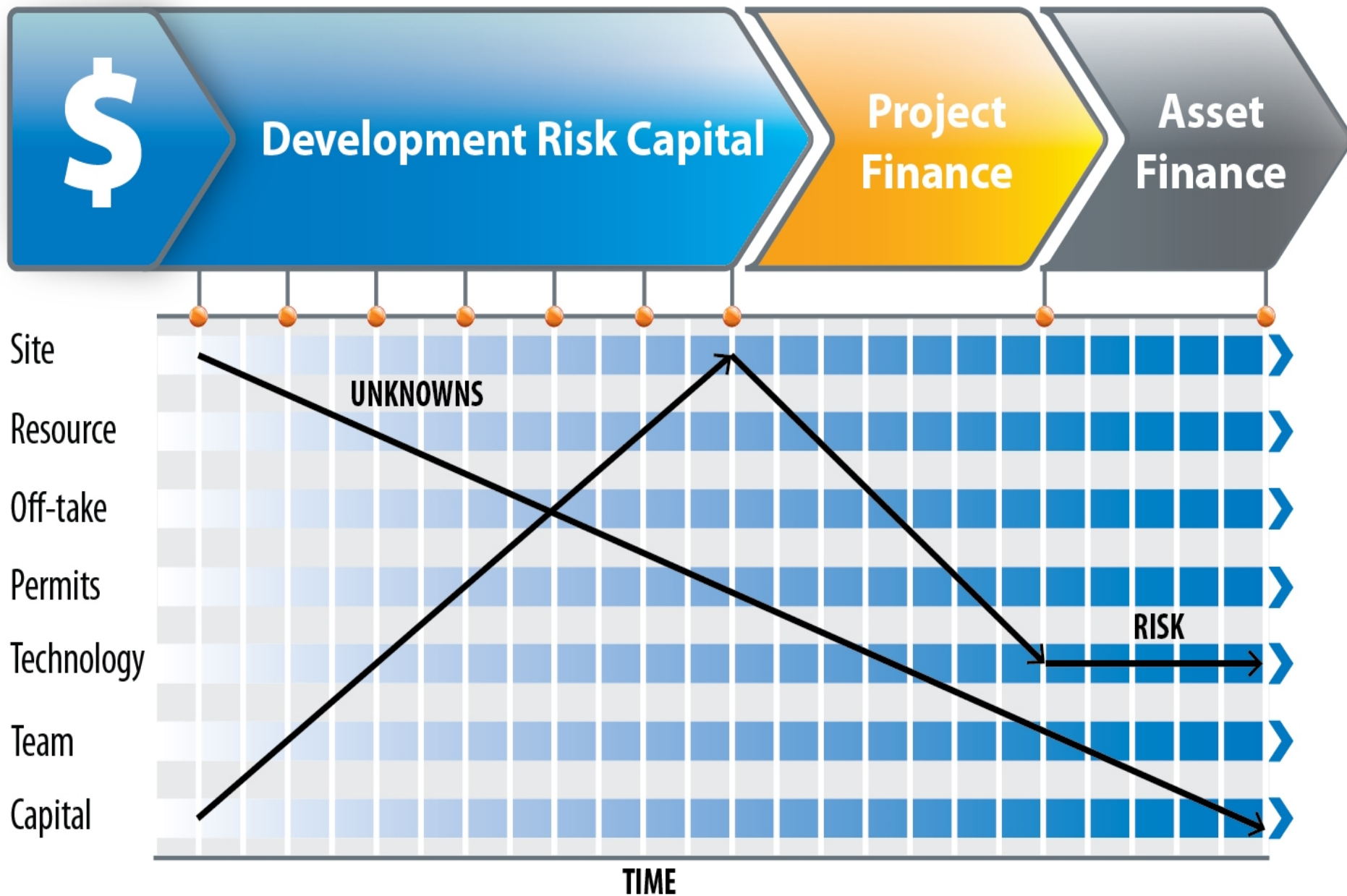
Off-take

Permits

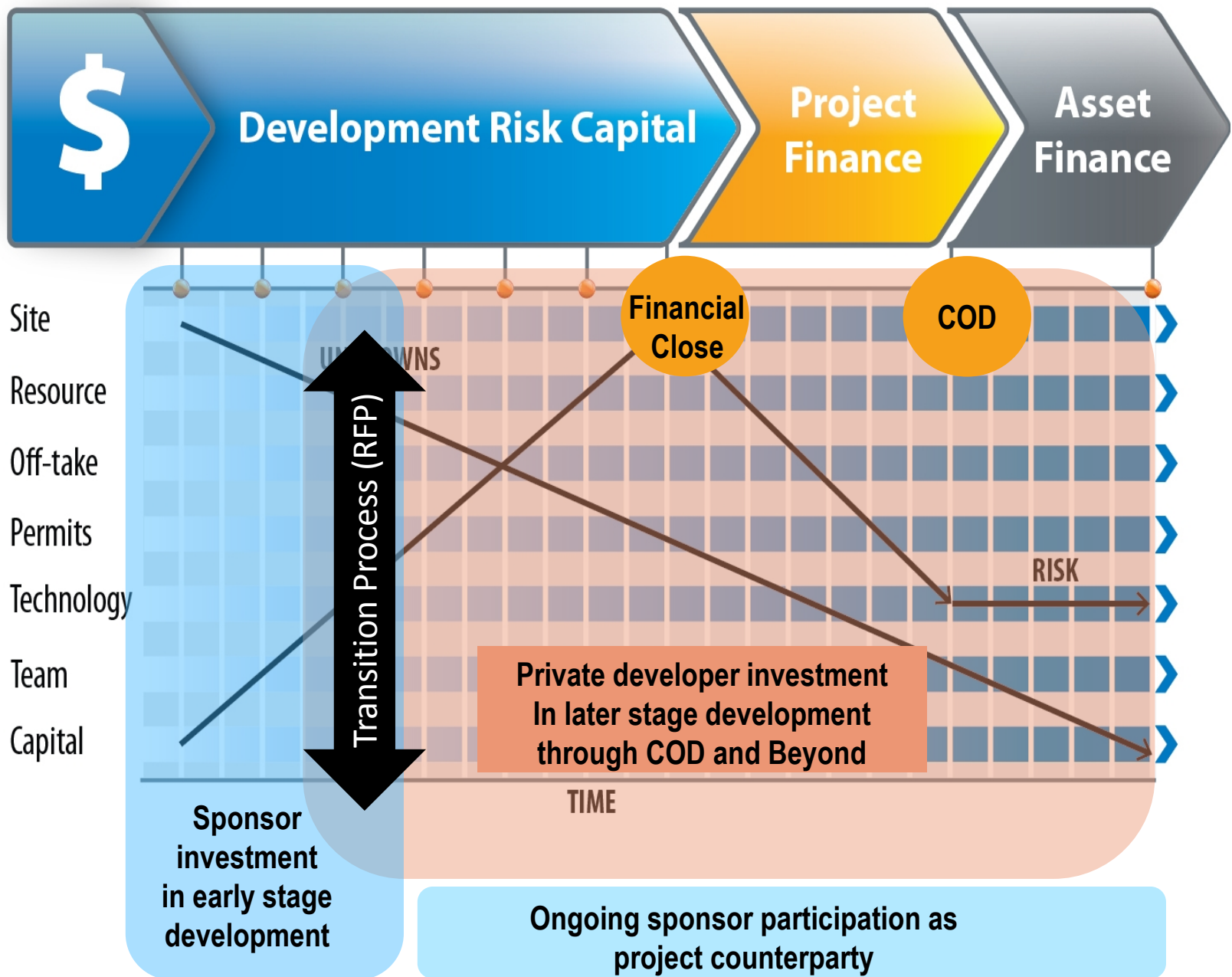
Technology

Team

Capital



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Process Discipline: SROPTTC™

Using this framework to visualize the development process:

- Best practice: process is iterative; each iteration aims to find a fatal flaw and end project – manage development risk.
- Best practice: not making the GO/NO-GO decision until the end; incremental decisions followed by incremental investments, managed investment risk.
- Best practice: focus on (invest in) pro forma inputs incrementally, maximizing yield on every dollar invested.

Pitfalls:

- (1) Mistaking each iteration for final “go/no-go,” vs. “go forward/stop”
- (2) Not getting out early enough on bad projects (even if investment would be lost)
- (3) Not investing for fear “it won’t work;” BEPTC™ probably not fully developed, which may indicate that doing nothing is riskier than investing under uncertainty

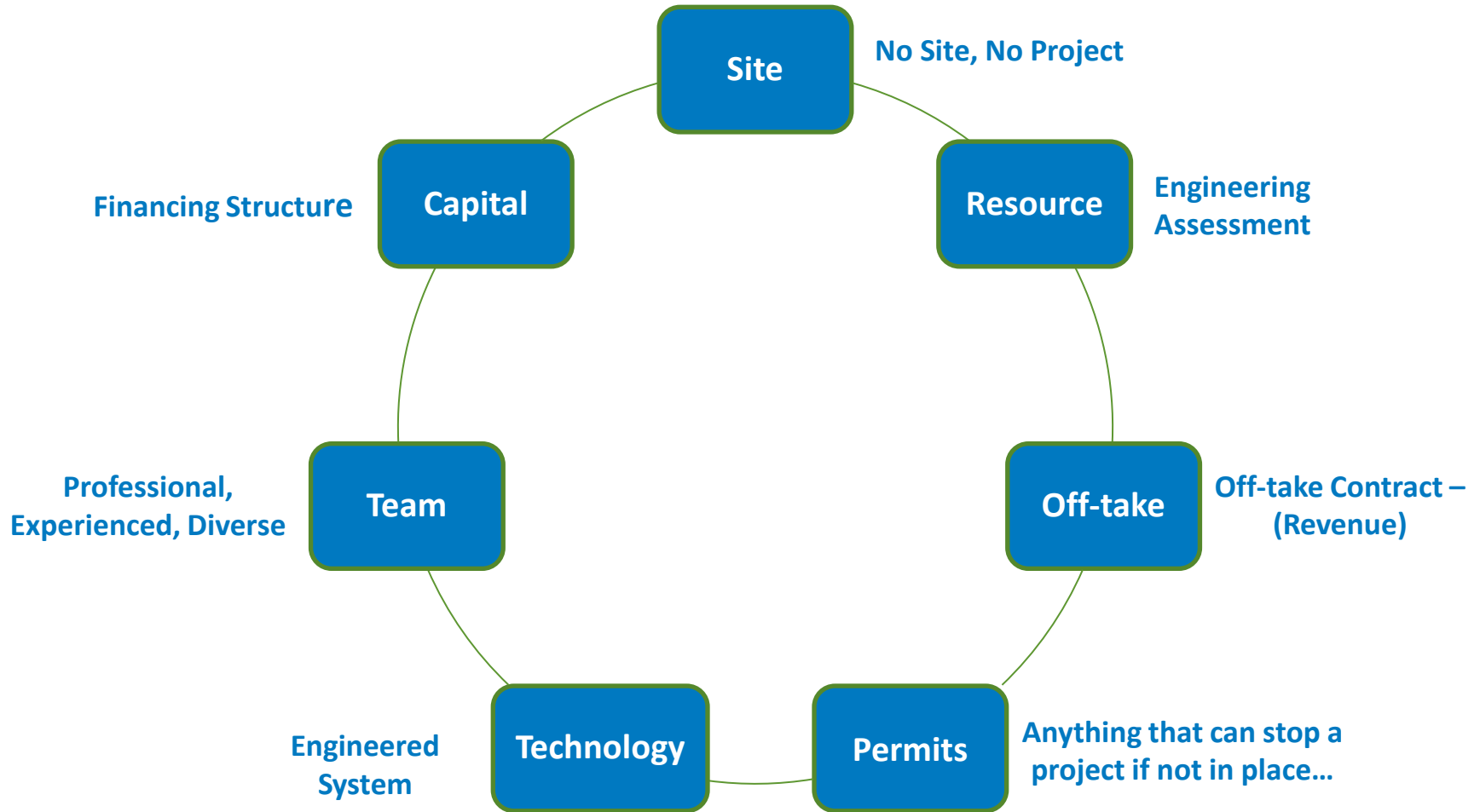
Framework for Information

Site	Resource	Off-Take	Permits	Technology	Team	Capital
No Site, No Project	Engineering Assessment	Off-take Contract – (Revenue)	Anything that can stop a project if not in place...	Engineered System	Professional, Experienced, Diverse	Financing Structure
• Site control • Size and shape • Location to load and T&D • Long-term control • Financial control • Clear title • Lease terms • Collateral concerns • Environmental • Access • O&M access • Upgradable	• Volume/Frequency • Variability • Characteristics (power/speed) • 24-hour profile • Monthly, seasonal and annual variability • Weather dependence • Data history • Std. Deviation • Technology suitability	• Credit of counterparty • Length of contract • Terms and conditions • Reps and warranties • Assignment • Curtailment • Interconnection • Performance • Enforcement • Take or pay • Pricing and terms	• Permitting/entitlements • Land disturbance • Environmental • Cultural impacts • Resource assessments • Wildlife impacts • Habitat • NEPA, EIS • Utility inter-connection • Other utility or PUC approvals	• Engineering design plans • Construction plans • Not generic solar panel and inverter • Engineered resource/conversion technology/balance of system designs • Specifications • Bid set	• Business management • Technical expertise • Legal expertise • Financial expertise • Utility interconnection expertise • Construction/contract management • Operations • Power marketing/sales	• Development equity • Project equity • Project debt • Mezzanine or bridge facility • Tax equity • Grants, rebates, other incentives • Environmental attribute sales contracts (RECs) • Bond finance • Non-recourse project finance

CONTINUOUS, ITERATIVE PROCESS

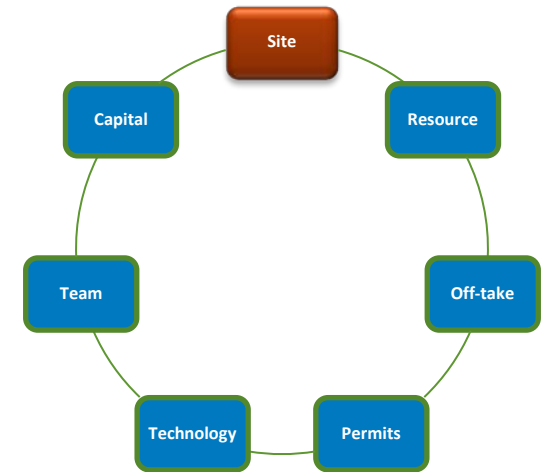
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Iterative Process



Site

- **Purpose:**
 - Understanding site availability and characteristics.
- **Considerations:**
 - Site control
 - Size and shape
 - Distance to usable transmission
 - Upgradeable
 - Road access for operations and maintenance



Resource

- **Purpose:**
 - Understanding what renewable resources are available and usable on site.
- **Considerations:**
 - Resource availability
 - Resource variability
 - 24-hour resource profile
 - Weather dependence
 - Technology suitability

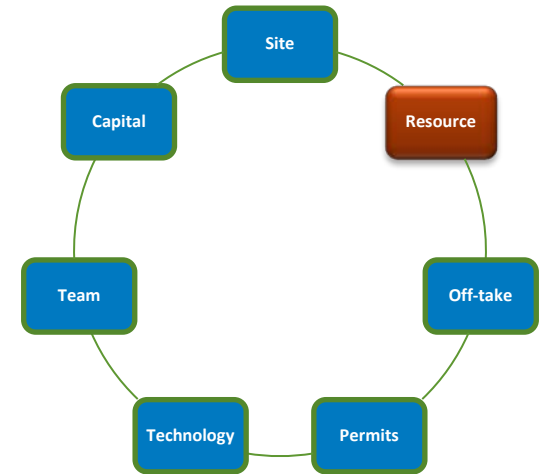
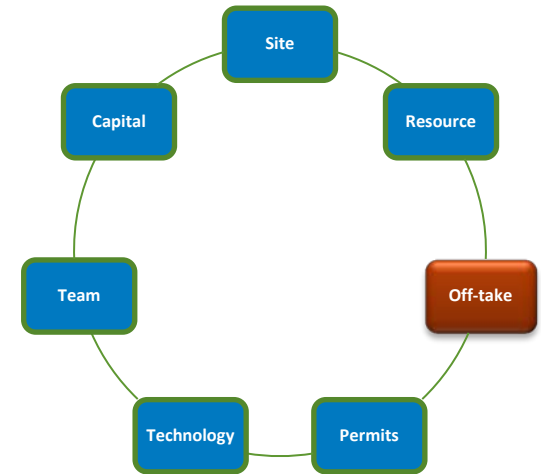


Photo from SkyFuel, Inc., NREL/PIX 18227

Off-Take

- **Purpose:**
 - Understanding the power buyer and utility interactions.
- **Considerations:**
 - Utility operations
 - Regulatory governance (e.g. PUC)
 - Interconnection agreement
 - Parameters
 - Pricing and terms



NREL/PIX 19498

Permits

- **Purpose:**
 - Understanding necessary regulatory requirements for the project
- **Considerations:**
 - Interconnection
 - Environmental (NEPA, EIS)
 - Cultural
 - State use permits

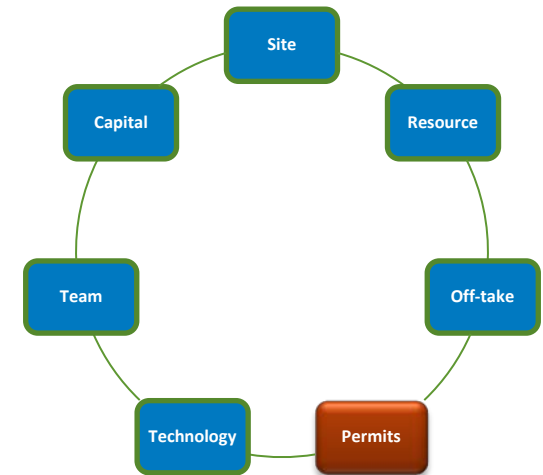


Photo from Catherine Hart; Greensburg GreenTown, NREL/PIX 17013

Technology

- **Purpose:**
 - Identifying specific technology type to develop the resource.
- **Considerations:**
 - Engineering design plans
 - Construction plans
 - Technology specifications development for bid

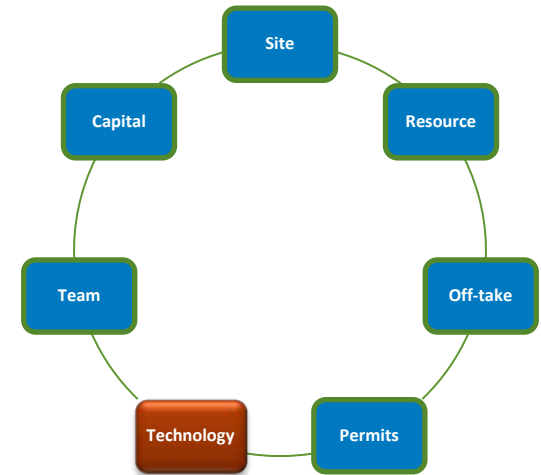


Photo from Jenny Hager Photography, NREL/PIX 15989

Team

- **Purpose:**
 - Ensure all relevant players (internal and external) are engaged in the project at the right time, levels, and roles
- **Considerations:**
 - Engage:
 - Decision Makers
 - Project & Business Management
 - Professionals & Staff
 - Employ Experts:
 - Legal & Financing
 - Technical & Construction
 - Power Marketing

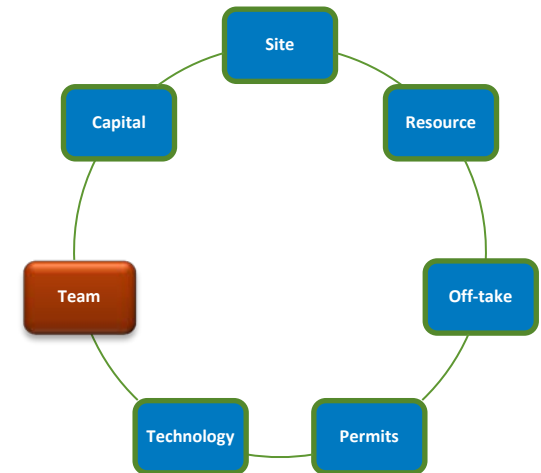
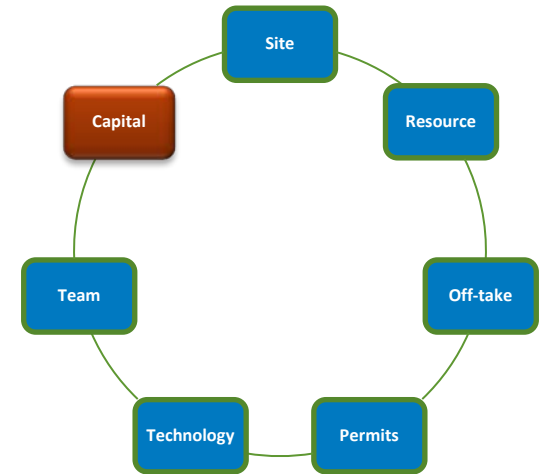


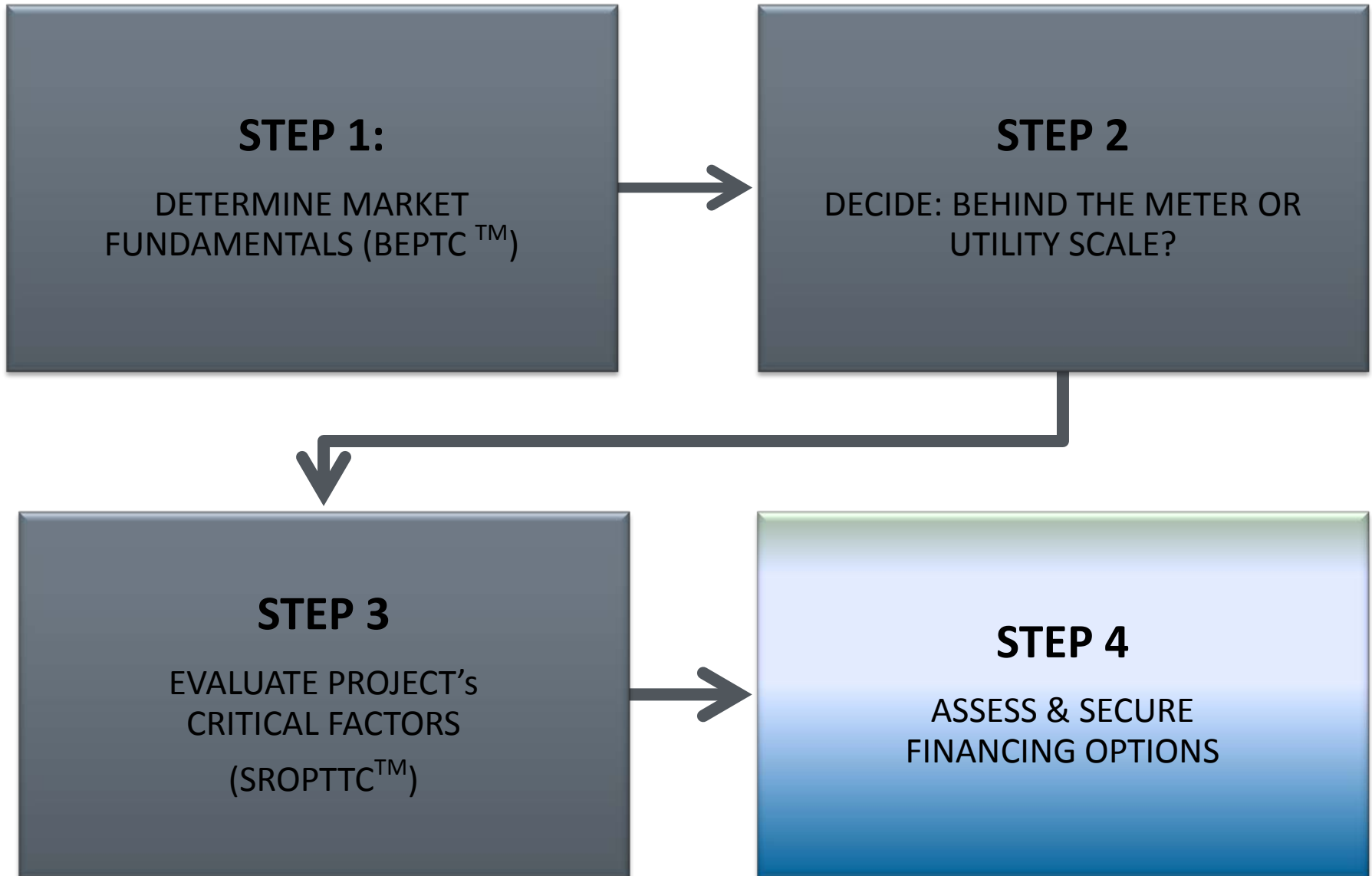
Photo from Central and South West Services, NREL/PIX 06594

Capital

- **Purpose:**
 - With all other elements in place, capital can be attracted to the project.
- **Considerations:**
 - Business Structures
 - Achievable Capital Structure
 - Timing
 - Perception of Risk/Reward



Project Development & Finance Road Map



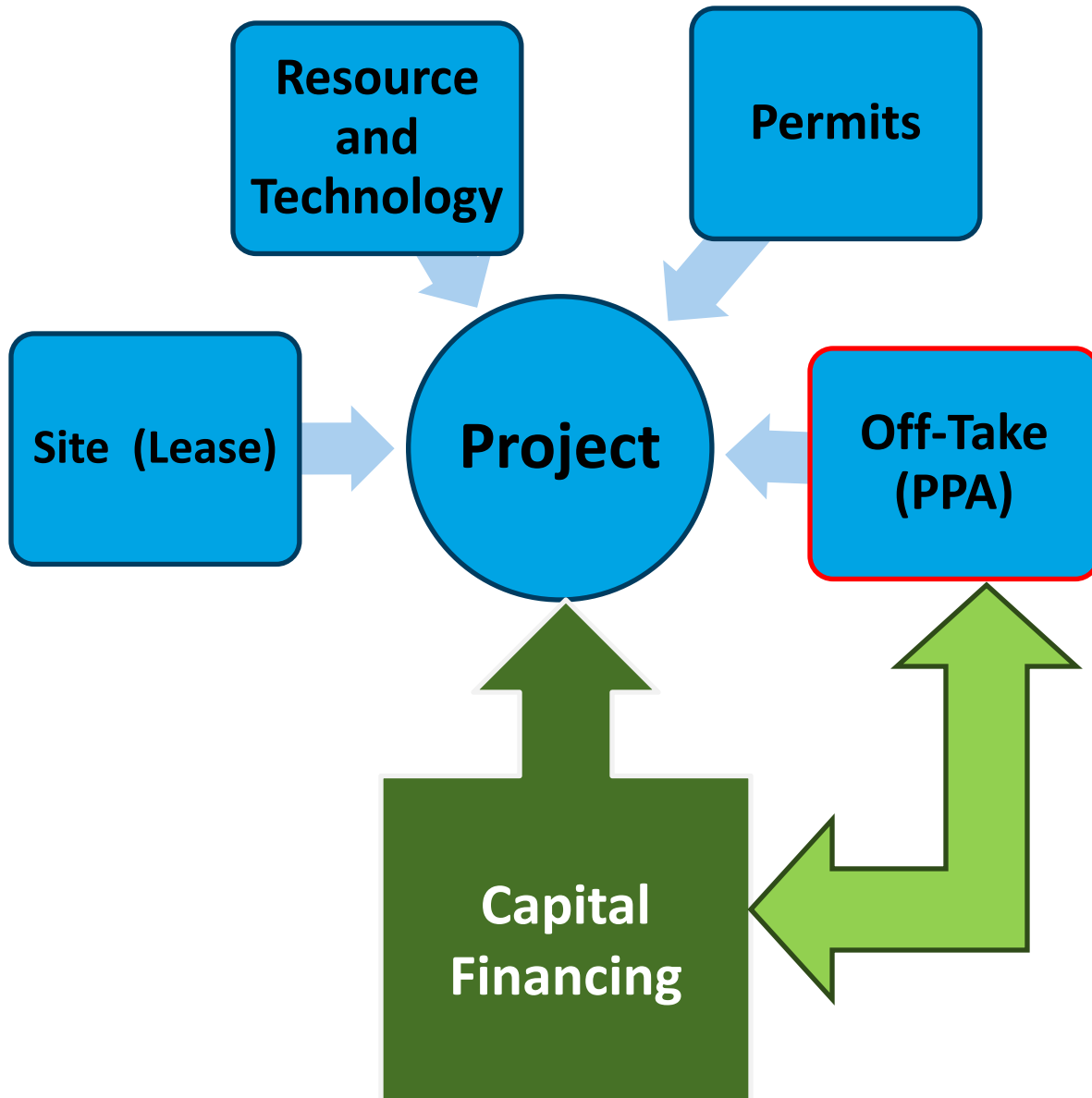
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Renewable Project Finance

- **Economics are Dependent on Tax Equity/Other Policy**
 - Governments/non-profits have no tax appetite
 - Utilities may value Renewable Energy Credits (REC) to satisfy legal requirements
 - 3rd party finance is the solution
- **Key Contract: Power Purchase Agreement (PPA)**
 - A long term, financeable commitment to buy project output – in kWh's and/or attributes (like RECs)
 - Allows developer to monetize tax or other policies

➤ Several common financing structures and financing sources are used by the renewable energy industry to finance a PPA

Project Finance



Project Finance Capital Examples (For Illustration Only)

	Project Debt			Tax Equity		Lease Equity	DOE
	Bank	Private Bond	Term Loan	Levered	Unlevered		
Investor Universe	Commercial Banks	Private or 144A Offering	Institutional investors w/energy focus	Financial investors and some corps. with tax appetite.		Lease equity market, institutional	DOE supports 100% or 80%
Target Rating	"Investment Grade" no rating needed	BBB-/NAIC 2	B is doable; BB is preferred	NA (Investment Grade Offtaker)		NA (Invest. Grade Offtake)	NA
Market Capacity	Up to \$1 Billion; up to 1.0XDSCR in Low Case	+\$1.0 Billion	\$750 Million	Sized to target IRR		Sized to 20-49% of Capital Stack	No Limit
Indicative Pricing	L+250-350 2007: 100-150 +fees 1.5-2.0%	7% Area; T + 5%-6% Fixed	L+250-500; 425 - 450 Libor floor;	11-13.5; IRR by Flip	9-10.5% IRR by Flip	9.0-12.5% after tax yield	T+75-100 bps
Tenor	5-7 years typical, up to 15	Term of PPA (20-25); Prepayment Penalty	Up to 7 years	Target IRR reached by year 10 with PTC; 6-7 with ITC		80% of Useful Life	Up to 30 years
Sizing Profile	DSCR Requirements 1.30-1.40X; lockbox; PPA 'Tail'; EPC with credit support; LIBOR Swaps; Reserves		1% amortization with cash sweep	Downside flip dates: +3 years in downside; +6 years in severe downside		1.30-1.40 "RSCR" Like Project Debt	Driven by required Ratings

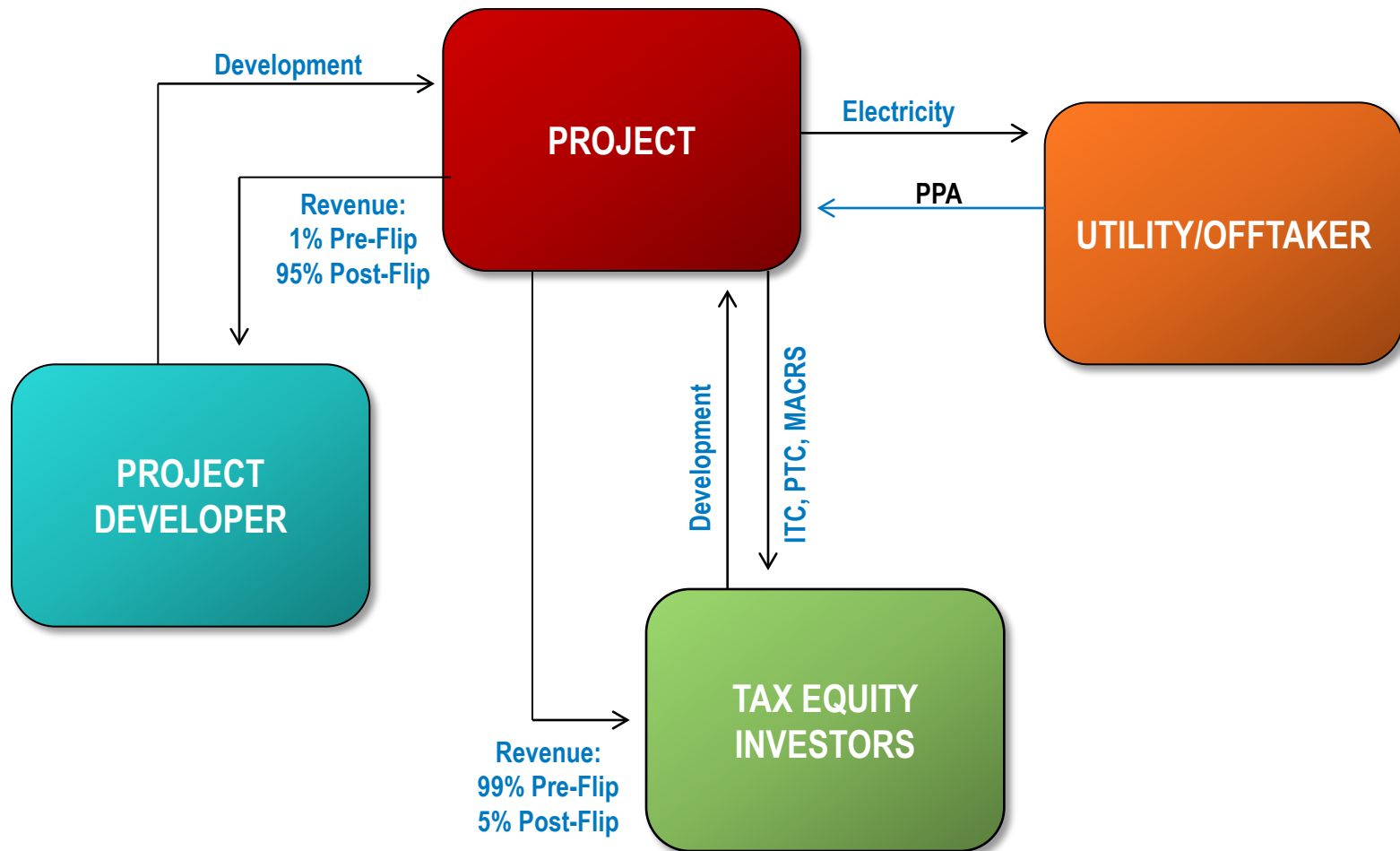
Tax Equity Financing Structures

Options	How Tax Equity Return is Earned
Partnership Flip	Tax equity invests capital to achieve target IRR. Upon achievement to target IRR ownership interest automatically “flips” down to contract percentage.
Sale Leaseback	Tax equity buys project and leases it back to developer for a term of years.
Inverted Lease	Tax equity invests capital for a preferred return that includes a “pass through” of credit by operation of tax election.

Capital/Cash Flows and Deal Structuring

- ***Partnership Flip Example – Anatomy of a Deal***
 - An illustration of participants' roles in a partnership flip transaction
 - A PPA is assumed to be in place – for kWh sales and/or REC sales
 - We will visualize the cash flows for each participant
- ***Key Contract: PPA***
 - A long term, financeable commitment to buy project output – in kWh's and/or attributes (like RECs)
 - Allows developer to monetize tax or other policies

Financing Option: Partnership Flip

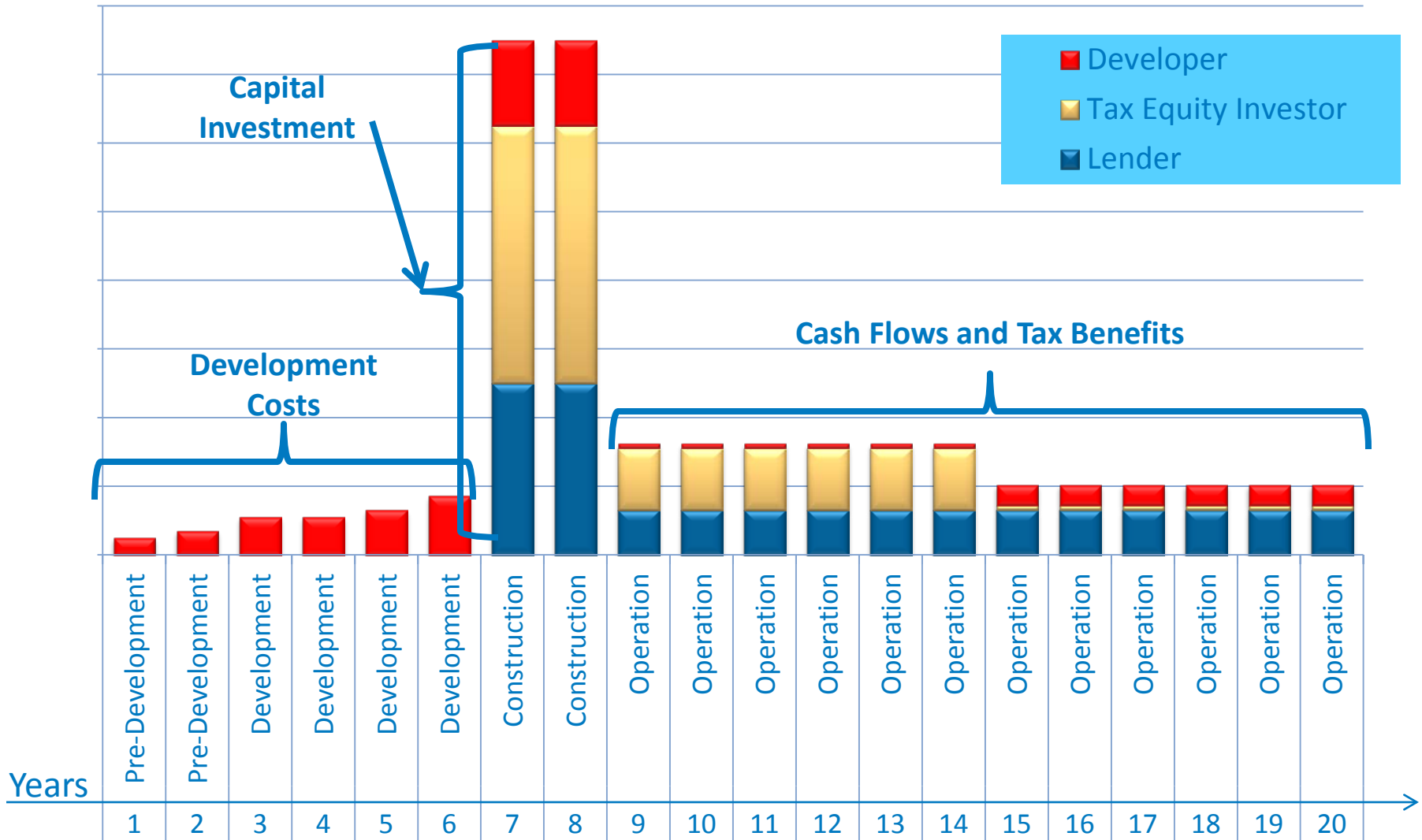


Source: Graphs adapted by NREL from 'Renewable Energy Project Finance in the U.S.: An Overview and Midterm Outlook' (Mintz Levin Green Paper, 2010)

Project Development

Project
Construction

Project Operation



Cash Flows in Time - Illustration

THANK YOU!



Robert Springer:
Robert.Springer@nrel.gov

Useful Resources

PROJECT MOTIVATION “POLICY”

- Deregulated states: http://www.eia.gov/cneaf/electricity/page/restructuring/restructure_elect.html
- Renewable Portfolio Standard of States: [http://en.openei.org/wiki/Renewable Portfolio Standard](http://en.openei.org/wiki/Renewable_Portfolio_Standard)
- Net Metering: http://en.openei.org/wiki/Net_Metering
- Incentives: <http://www.dsireusa.org/>

PROJECT MOTIVATION “TECHNOLOGY”

- Resource Maps: <http://www.nrel.gov/gis/maps.html>

Useful Resources

PROJECT DEVELOPMENT & FINANCE “GENERAL”

- For General Project Development & Finance:
http://www.nrel.gov/applying_technologies/financing.html

PROJECT DEVELOPMENT “RESOURCES”

- See RE 101 Slides from Andy Walker

PROJECT DEVELOPMENT “OFF-TAKE”

- Power Purchase Agreement Checklist:
<http://www.nrel.gov/docs/fy10osti/46668.pdf>
- Renewable Portfolio Standards:
http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm

Useful Resources (Cont'd.)

PROJECT DEVELOPMENT “PERMITTING”

- Federal Energy Management Program Environmental Siting Guide:
http://www1.eere.energy.gov/femp/technologies/derchp_envsiting.html
- http://www1.eere.energy.gov/tribalenergy/guide/permitting_licensing.html.
- http://www1.eere.energy.gov/tribalenergy/guide/regulatory_agencies.html.

PROJECT DEVELOPMENT “TECHNOLOGY”

- General resource/technology page at: <http://teeic.anl.gov/er/index.cfm>
- For renewable energy resource assessment:
http://www1.eere.energy.gov/tribalenergy/guide/assessing_energy_resources.html.

PROJECT DEVELOPMENT “CAPITAL”

- For General Project Development & Finance:
http://www.nrel.gov/applying_technologies/financing.html