NREL
NATIONAL RENEWABLE ENERGY LABORATORY

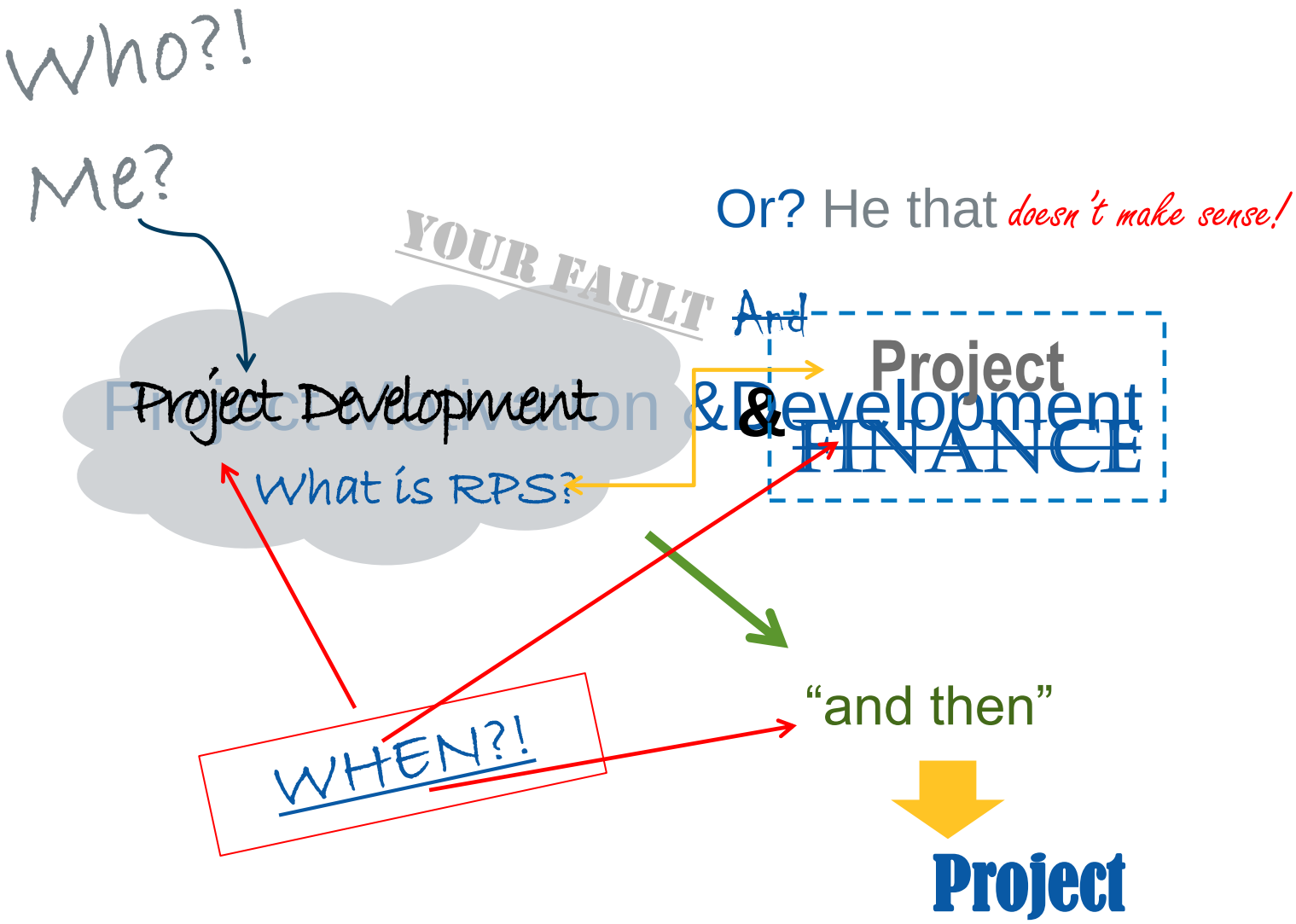
Getting from Goals to Projects in the Ground

Jeffrey Bedard

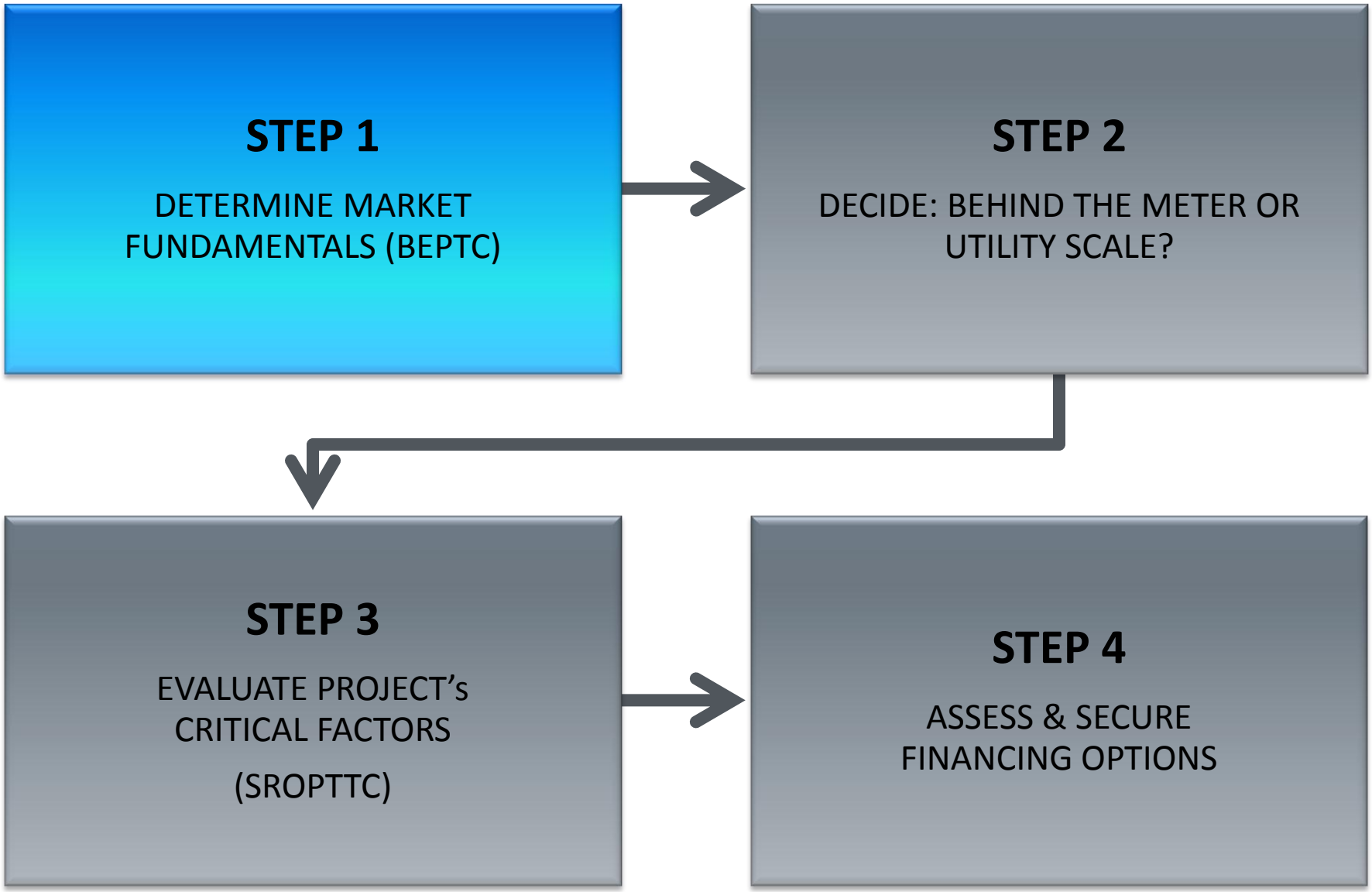
August 7, 2012

Intent

We will introduce to 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.


Who?!
Me?
YOUR FAULT
Project Development
What is RPS?
Project Motivation & Development
Or? He that doesn't make sense!
And
Project
& FINANCE
WHEN?!
"and then"
Project

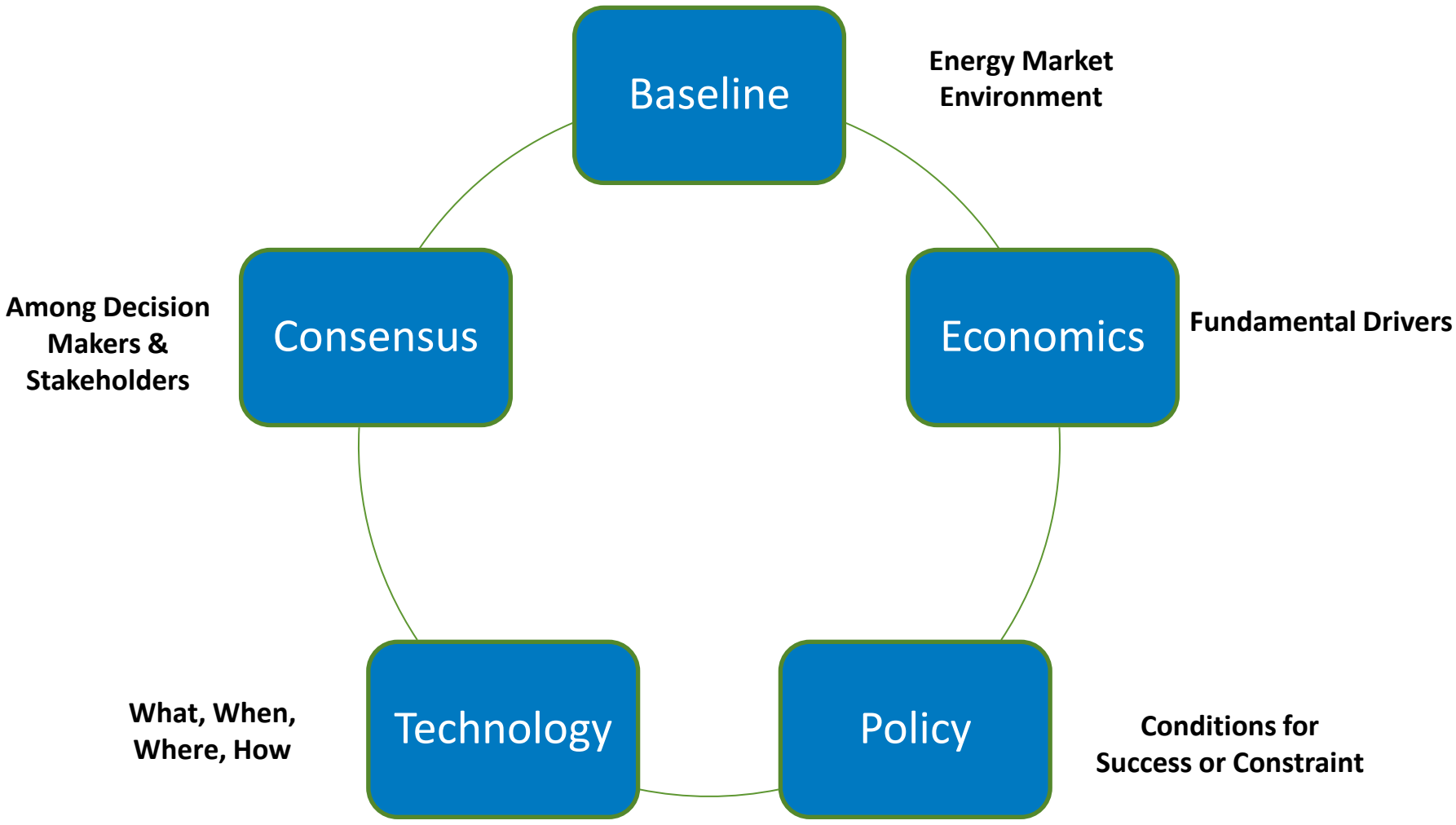
Project Development & Finance Road Map



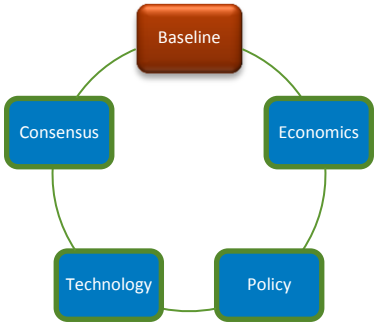
Key Concept: Fundamentals = Motivation

- 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.

Elements for Strong Motivation

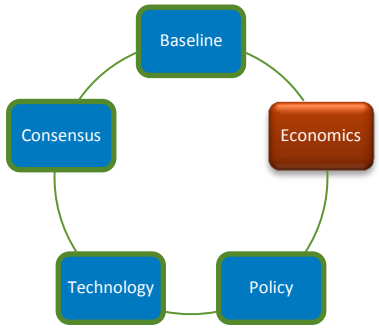


Baseline



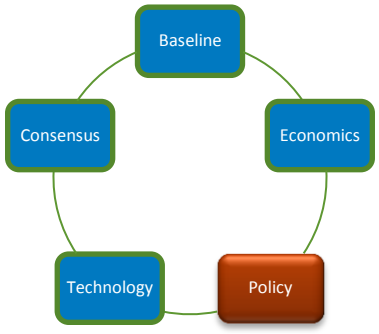
- **Purpose**
  - Establishes the key driver or characteristic of the local energy market
  - A good example is something that defines the competition and is the trade-off with renewables
  - Example: Hawaii and petroleum
- **Considerations**
  - Energy sources and fuels
  - Market dynamics; growth, 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

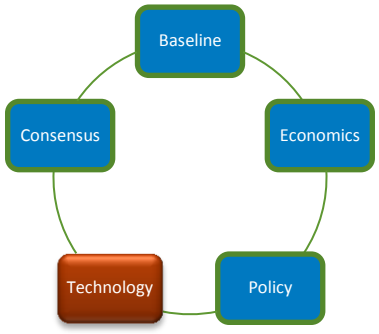
Policy



- **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

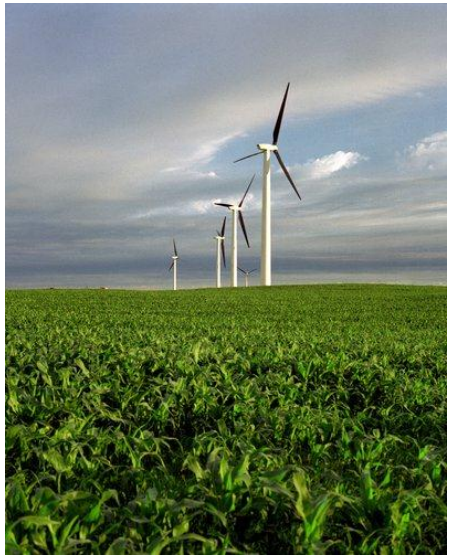
- **Considerations**
  - Government (Fed/state/local)
  - Internal (to your organization)
  - Market (regulation, market structure)

Technology

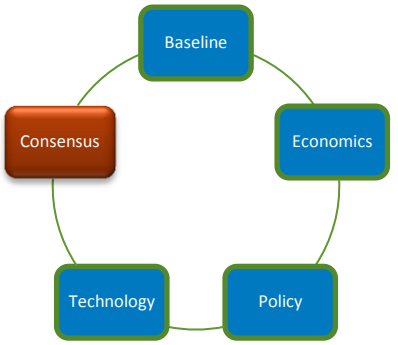


- **Purpose**
  - Preliminary resource assessment

- **Considerations**
  - Assessing commercial technologies
  - Reliability
  - Bankability



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?

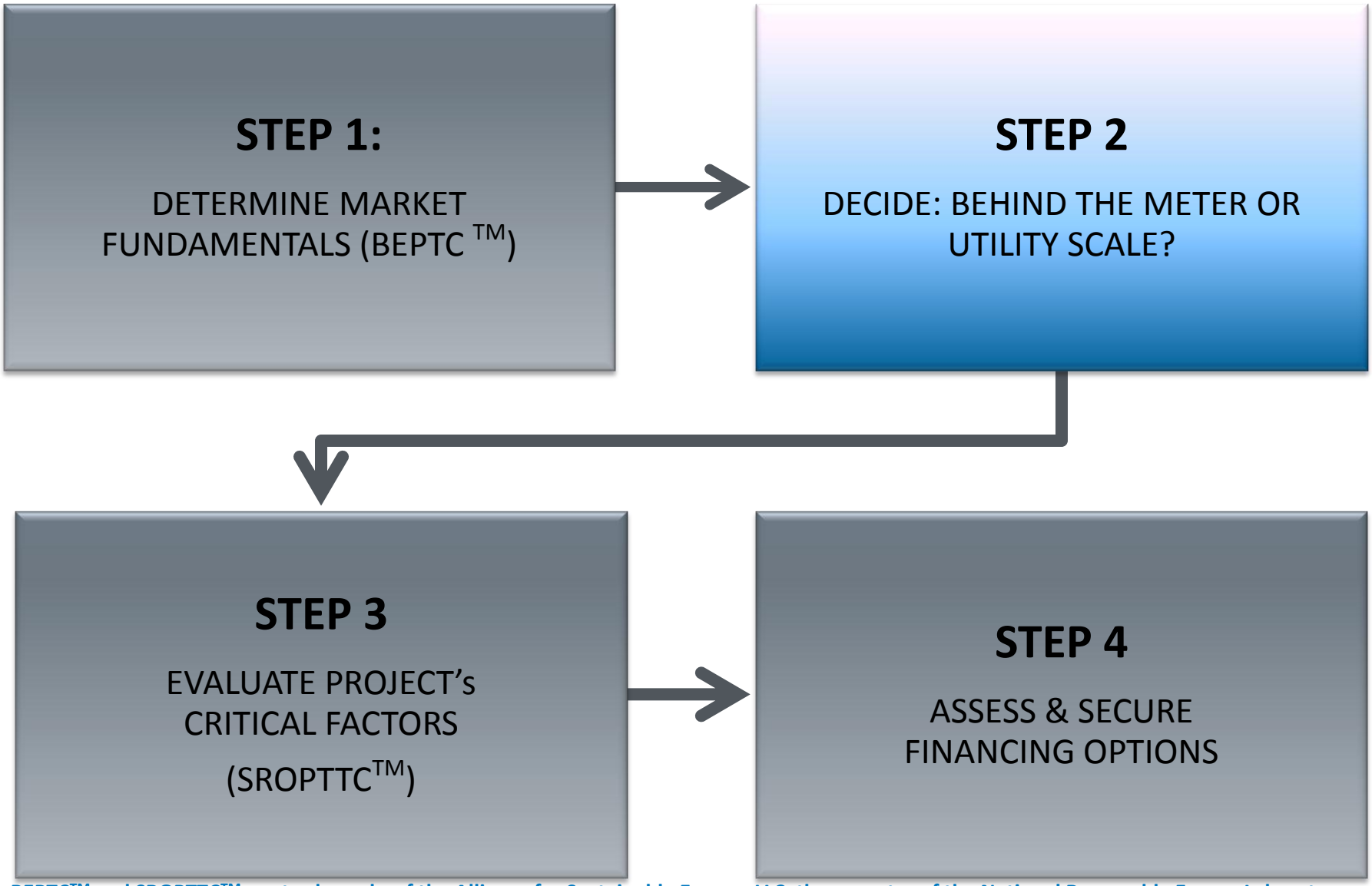
Summary of Market Fundamentals

Key Elements of Market Fundamentals

- **B**aseline: existing energy "reality"
- **E**conomics: fundamental driver(s)
- **P**olicy: create conditions for success
- **T**echnology: what, when, where, how many?
- **C**onsensus: establish, advance, defend

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

Project Development & Finance Road Map



Step 2: Directional Decision

Two Paths Forward:

THIRD PARTY PARTNERSHIP

Utility Scale – Sell to Utility

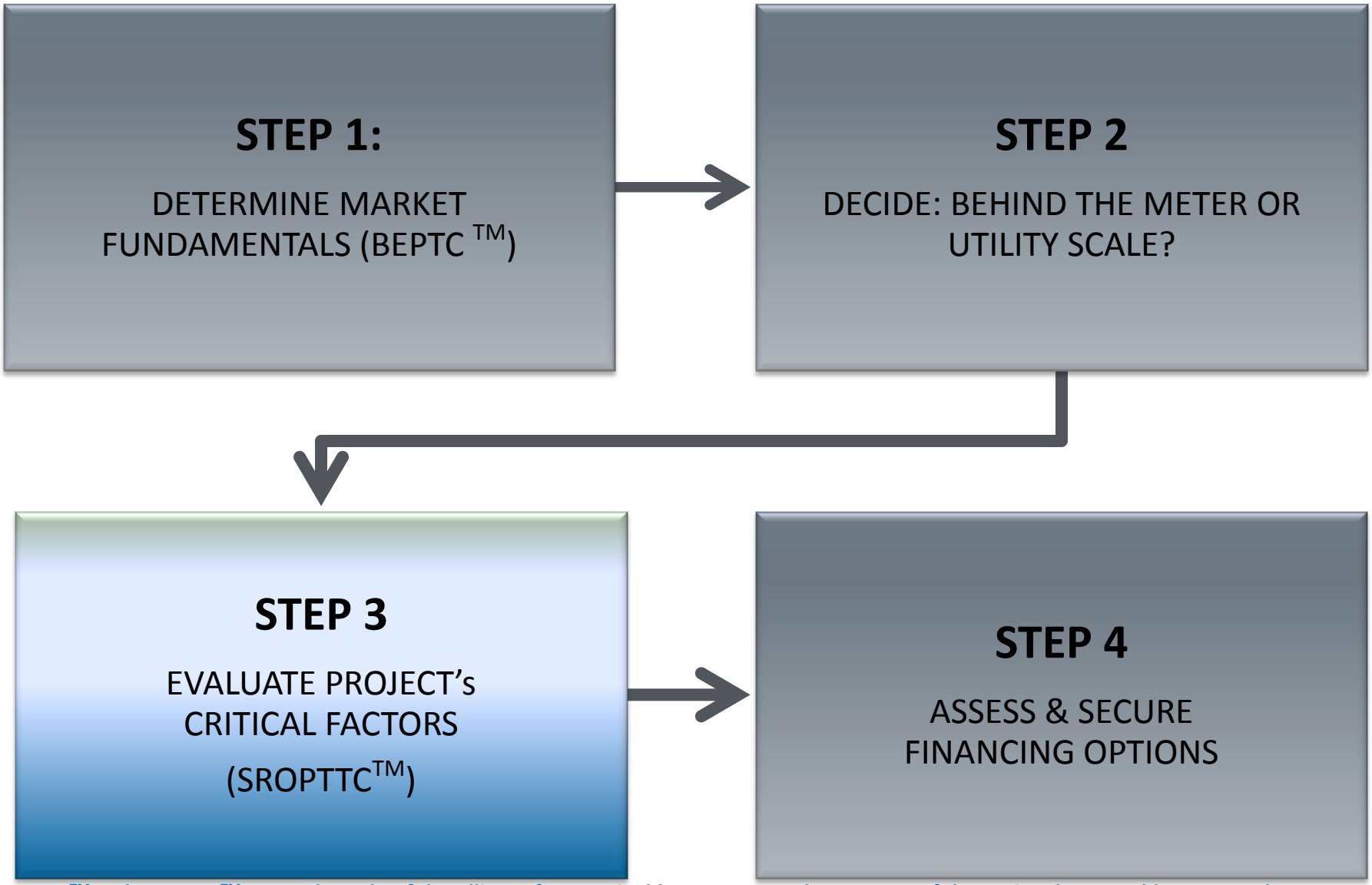
- Is access available to get energy to the market? (e.g. Transmission) - Interconnection/Regulation); Legal Environment. If yes, does the market have an appetite? At what price? Is that economic for project? YES / NO?

DIRECT OFFTAKE

Behind the Meter: facility buys output

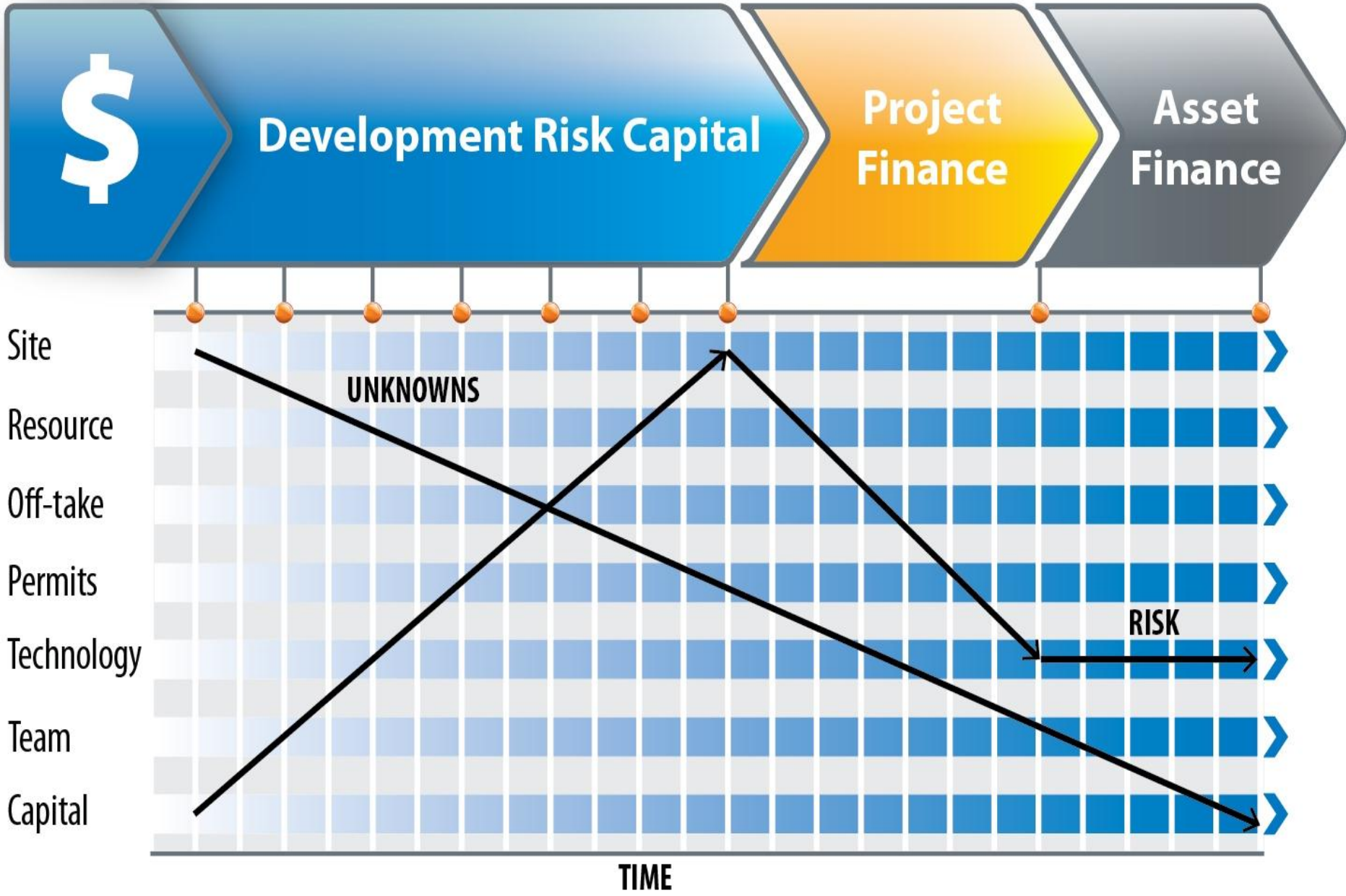
- If not commercial, will community scale work? What is interconnection/regulatory environment? Is behind the meter allowed? How? FIT, Net Metering, Other? Is it economic?

Project Development & Finance Road Map



Risk Mitigation

- Project Development is a risky endeavor
- In the early stages, YOU are the project developer
- Developers are rewarded by completed projects – CHALLENGE!
- A methodology and approach to project development follows:



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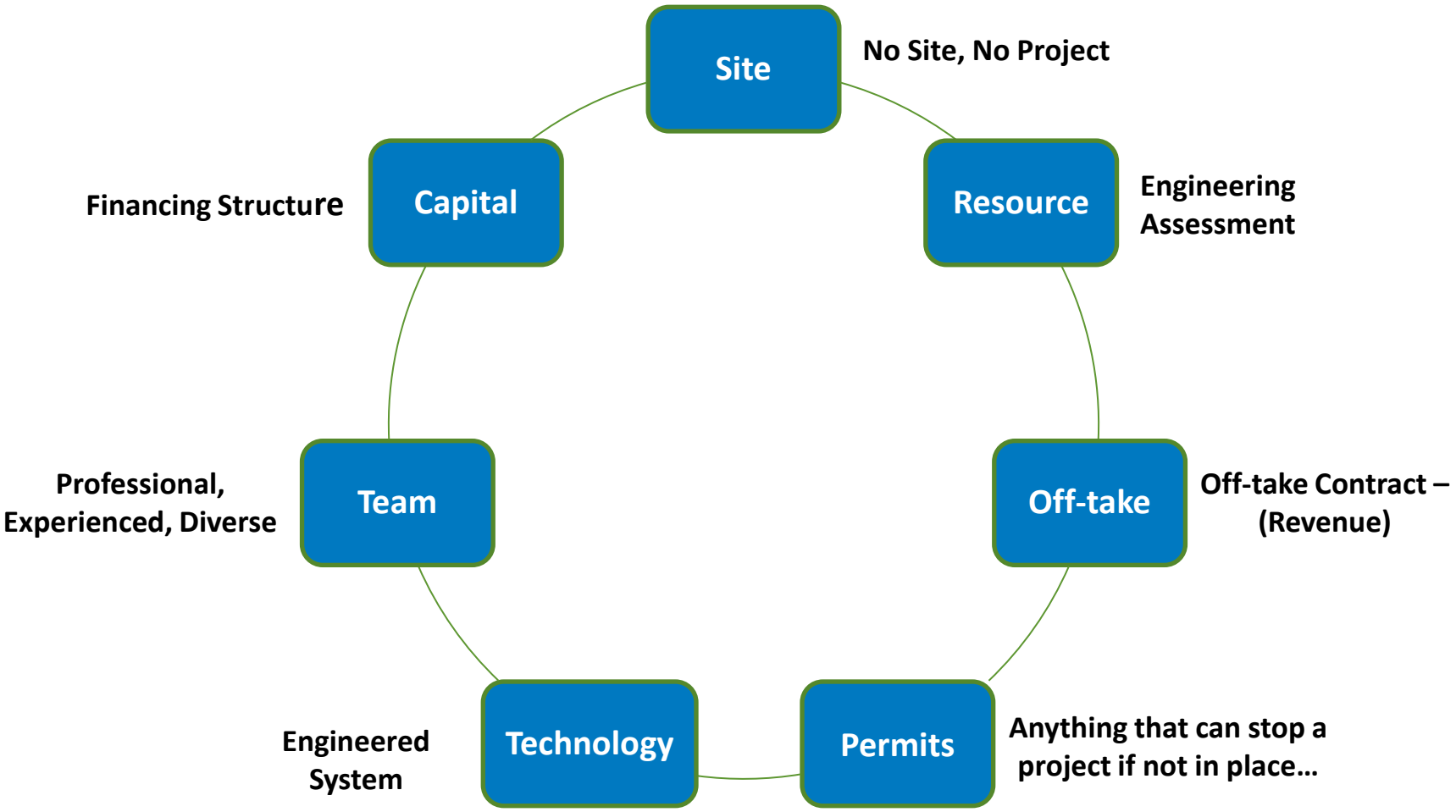
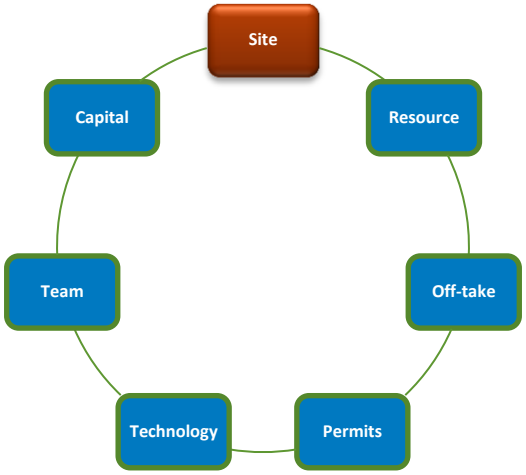
Iterative Process



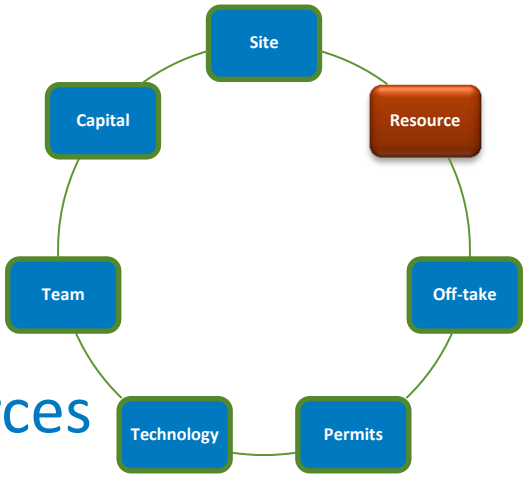
Site



- **Purpose:**
  - Understanding site availability and characteristics.

- **Considerations:**
  - Site control
  - Size and shape
  - Distance to usable transmission
  - Upgradeable
  - Road access for operations and maintenance

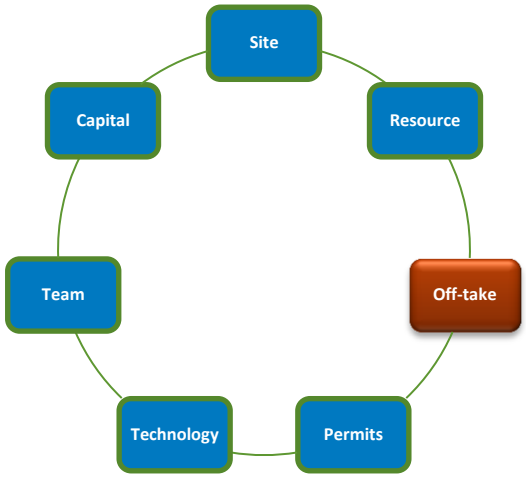
Resource



- **Purpose:**
  - Understanding what renewable resources are available and usable on site.

- **Considerations:**
  - Resource availability
  - Resource variability
  - 24-hour resource profile
  - Weather dependence
  - Technology suitability

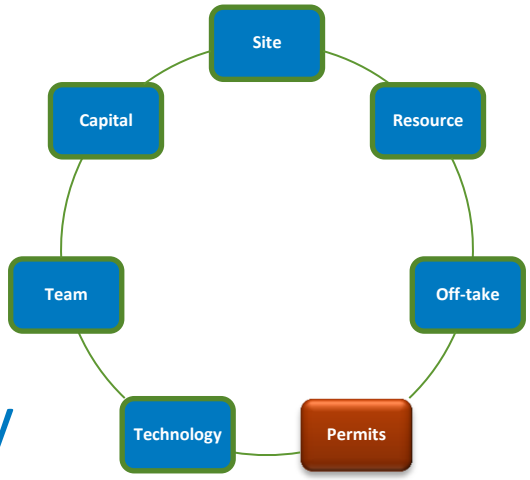
Off-take



- **Purpose:**
  - Understanding the power buyer and utility interactions.

- **Considerations:**
  - Utility operations
  - Regulatory governance (e.g. PUC)
  - Interconnection agreement
  - Parameters
  - Pricing and terms

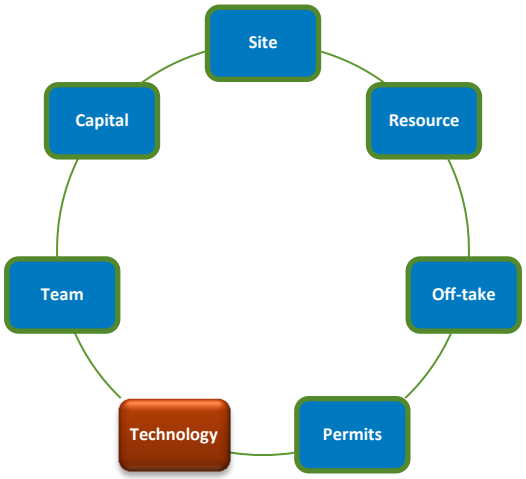
Permits



- **Purpose:**
  - Understanding necessary regulatory requirements for the project

- **Considerations:**
  - Interconnection
  - Environmental (NEPA, EIS)
  - Cultural
  - State use permits

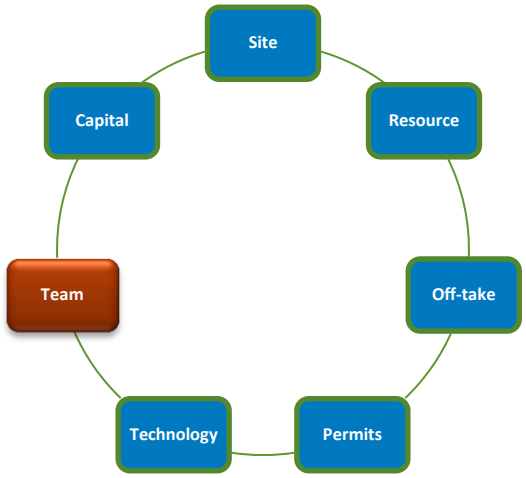
Technology



- **Purpose:**
  - Identifying specific technology type to develop the resource.

- **Considerations:**
  - Engineering design plans
  - Construction plans
  - Technology specifications development for bid

Team

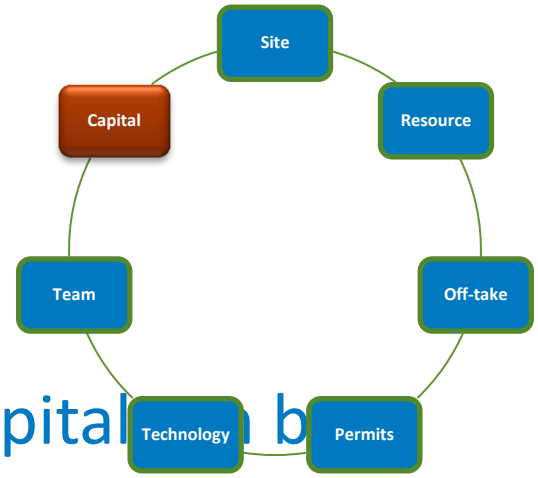


- **Purpose:**
  - Ensure all relevant players (internal and external)
  - are engaged in the project at the right time,
  - levels, and roles

- **Considerations:**
  - Engage:
    - Decision Makers
    - Project & Business Management
    - Professionals & Staff
  - Employ:
    - Legal & Financing
    - Technical & Construction
    - Power Marketing

} Expertise

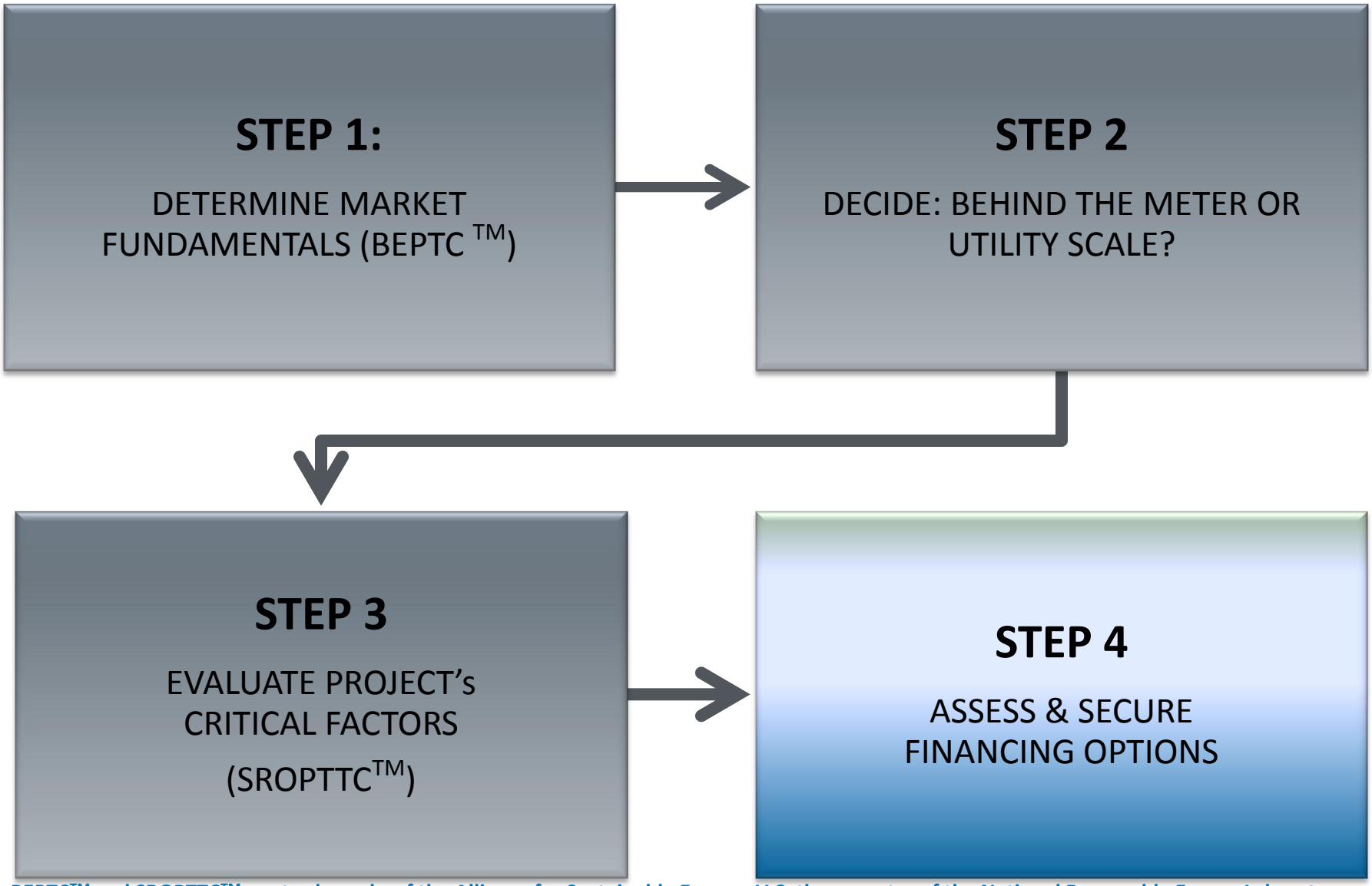
Capital



- **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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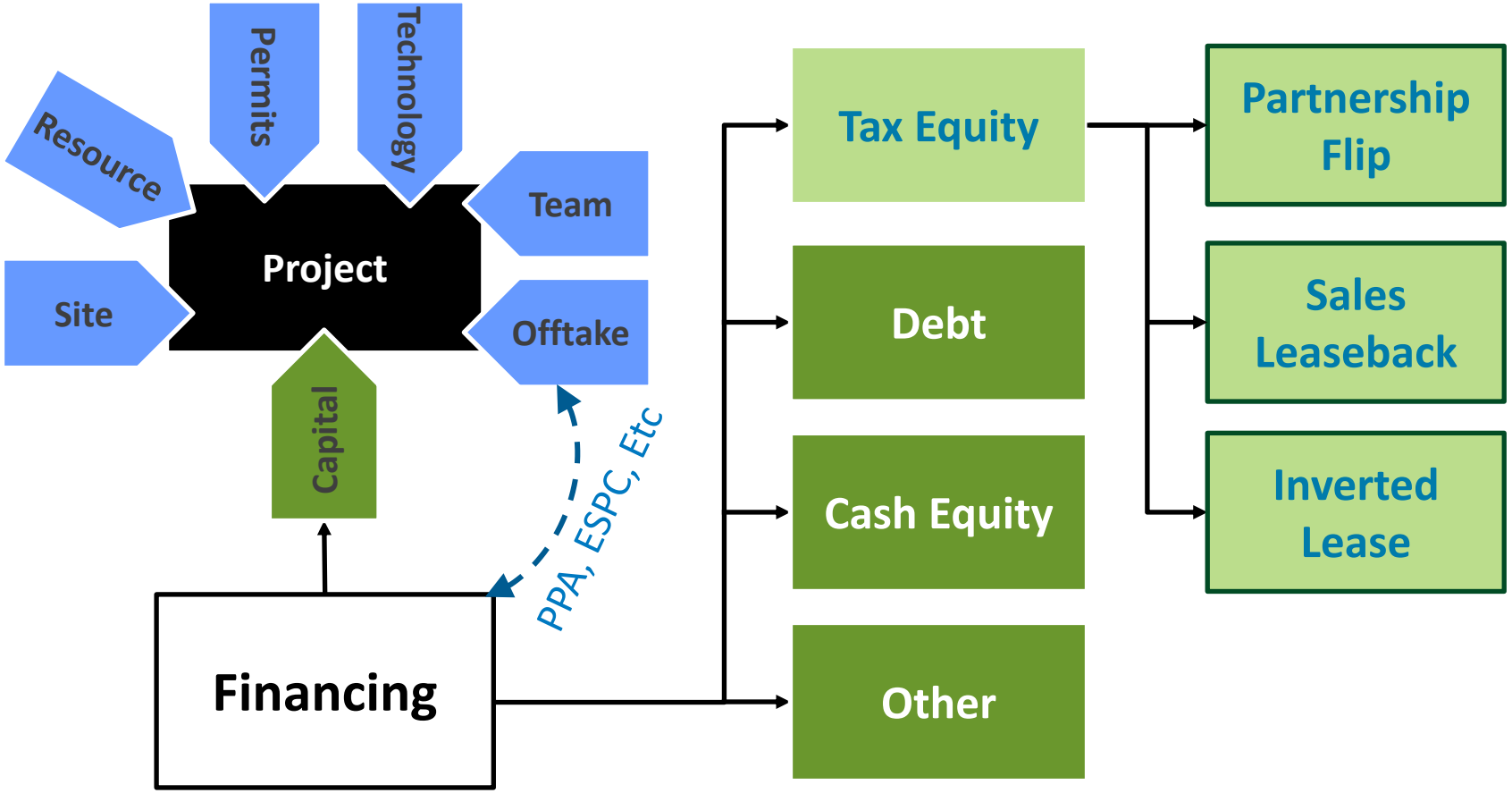
Renewable Project Finance

- **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), ESPC**
  - 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 an offtake contract

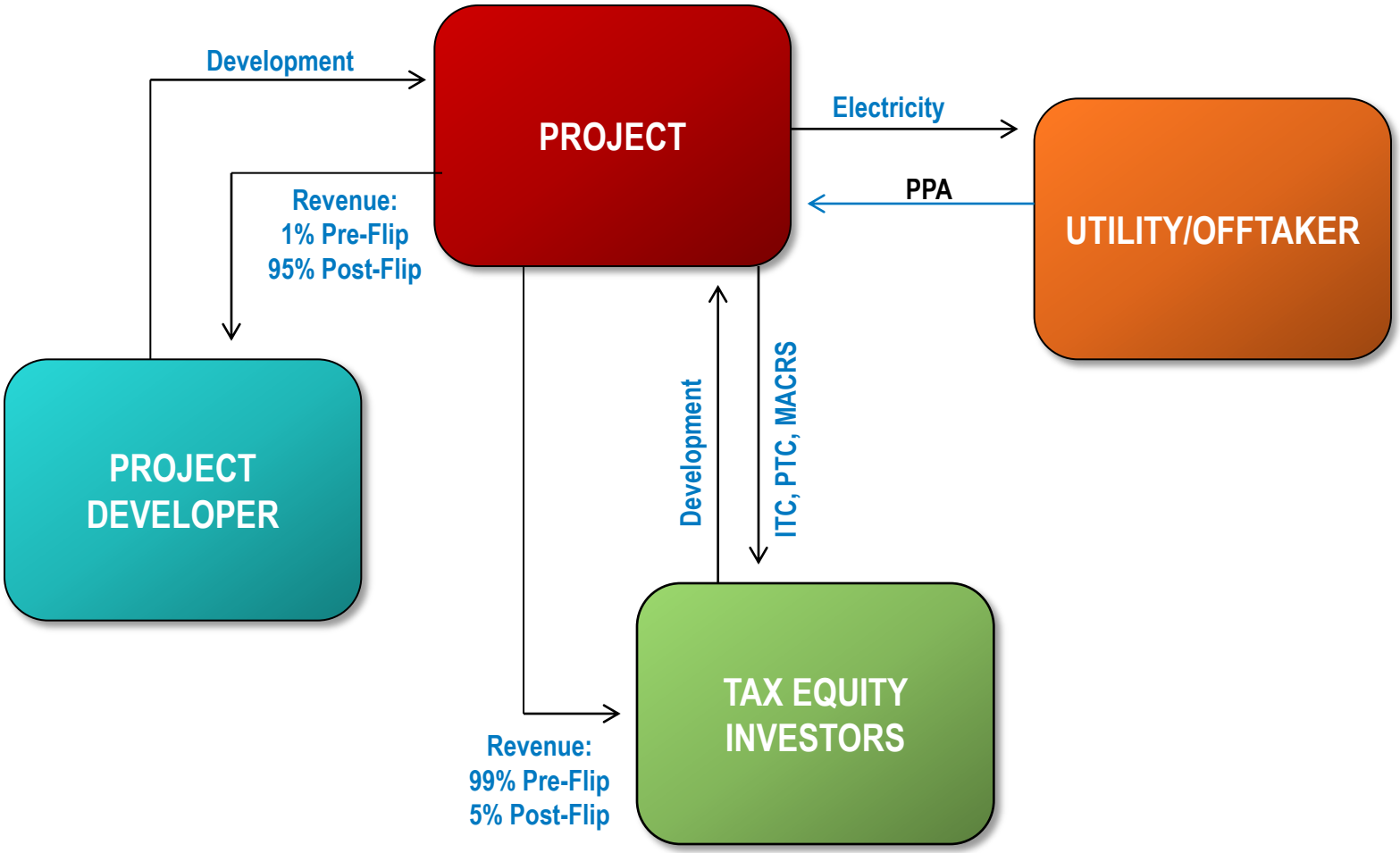
Renewable Energy Project Finance



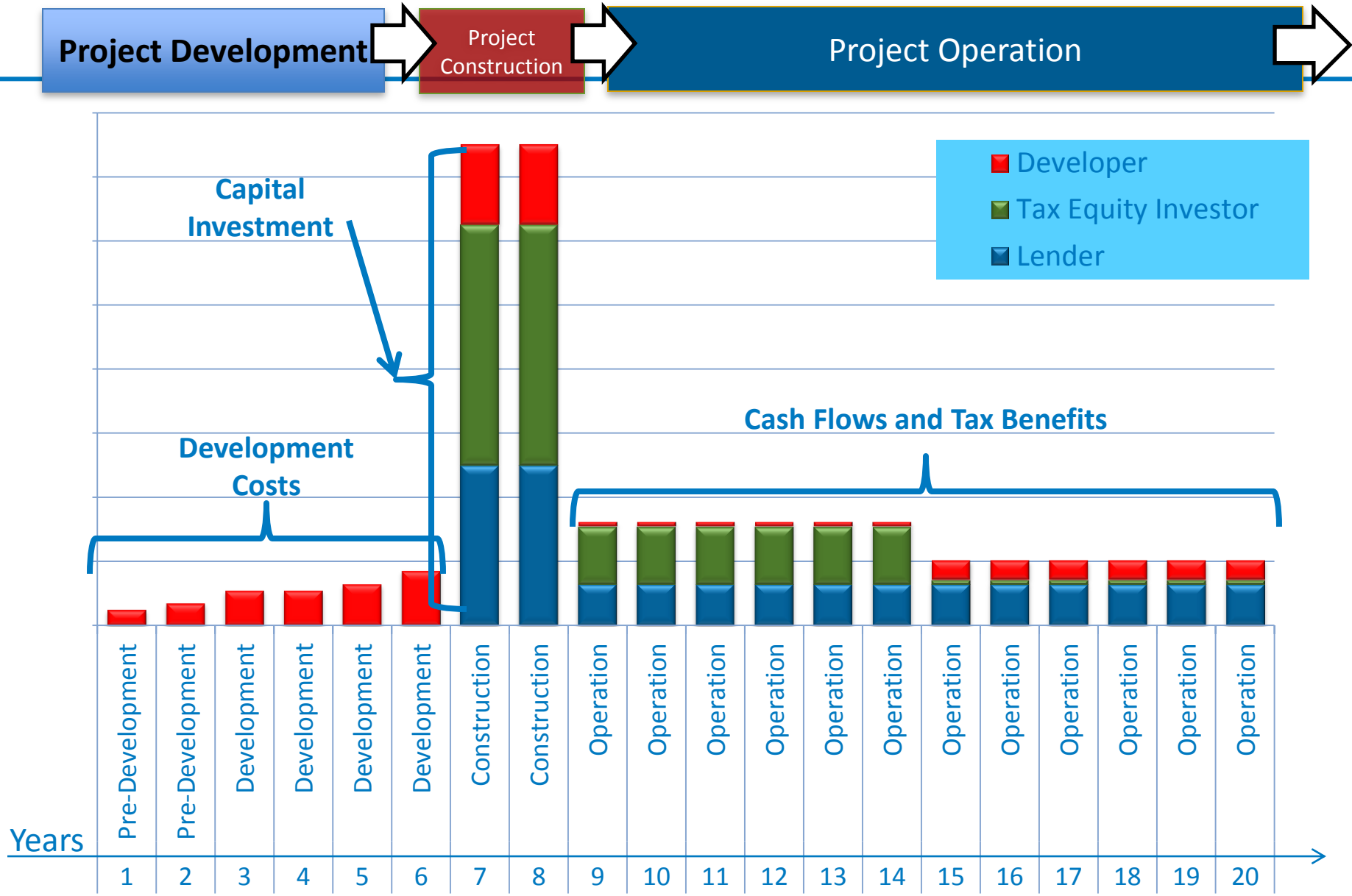
Tax Equity Financing Structures

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.

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)



Cash Flows in Time - Illustration

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THANK YOU!

Jeffrey Bedard:
Jeff.Bedard@nrel.gov

Useful Resources

PROEJCT 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
- 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

PROEJCT 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.)

PROEJCT DEVELOPMENT "PERMITTNG"

- 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