

SANTA FE COMMUNITY COLLEGE

Biofuel Center for Excellence

TEACHER MANUAL
BCX Renewable Energy
Business Development

BIOFUEL CENTER FOR EXCELLENCE

BCX Renewable Energy Business Development

Prepared by Margo Covington and Douglas Webb
Sustainable Communities: WAV – Links – Waste As Value Links

www.wavlinks.org

Po Box 1965

Santa Fe, New Mexico

Phone 505.982.0044

Email magro@wavlinks.org

Table of Contents

Renewable Energy Business Development Module Overview

Renewable Energy Project Development Process

Business Development Analysis Model

Appendix: to Business Development Analysis Model

Business Development Module – PowerPoint Presentation Outline

30 Minute Introduction to Business Development

45-60 Minute in-Depth Introduction to Business Development

PowerPoint Presentation Slides:

30 Minute Introduction to Business Development

45-60 Minute in Depth Introduction to Business Development

Workshop Activity: Evaluation & Certification

PowerPoint Presentation Slides

Renewable Energy Business Development

Introduction to Biofuels Industry Business Development

Workforce Development

For inclusion in 4 BCX technology workshop curricula

Overview

The two sections – 30-minute introduction and 60-minute detail – to be incorporated into the 4 BCX biofuels technologies curricula to introduce the trainees into the business development process for a biofuels project.

Objectives

- Understand the four stages of the project development cycle
- Understand the six elements of a renewable energy project
- Understand the three Master Documents of a successful project
- Create a “back of the napkin” feasibility study containing the six elements of a renewable energy project.

Activities

During the 30-minute introduction

- Discussion of feedstocks, market/offtake opportunities

During the 60-minute in-depth

- Each trainee will create a “back-of-the napkin” feasibility study
- Attendees will present and discuss their ideas and results.

Adaptations

The instructor can elect to add their feedstock and market/offtake suggestions to these modules.

Instructor is encouraged to read and present the accompanying handouts listed in Materials.

Materials

Slide Shows:

- 30-minute Introduction with Notes for Instructor
- 60-minute Detail

Handouts:

- Business Development Analysis Model
- Project Development Process Explanation

Other Resources

Are listed in the handouts.

Evaluation

Trainee in-workshop discussion participation.

Trainee's successful completion and presentation of their
"Back of the Napkin" Feasibility Study.

Renewable Energy

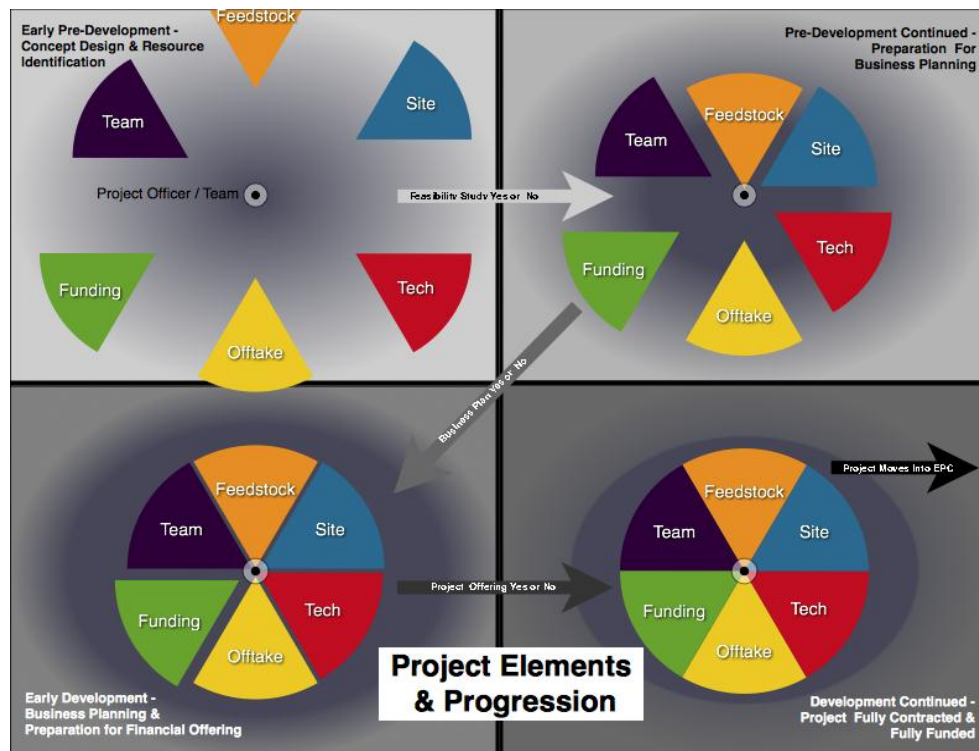
Project Development Process

Note: There are many types of renewable energy businesses. For the purpose of this workforce development training we will only consider those types of businesses that manufacture energy products from renewable resources.

Renewable Energy Project Development - Elements & Progression:

In the “Project Development Progression Chart” below, six essential elements common to all renewable energy projects are depicted as a pie chart. Each wedge represents one element. These six elements must all be “in place,” meaning fully contracted and fully funded before any renewable energy project can be built and operated. They are:

- **Team** - The people responsible for the project’s conceptualization leading to a detailed and comprehensive feasibility study, writing or overseeing the writing of its business plan, writing or overseeing the writing of a financial offering, marketing that offering to potential investors and or brokers and securing the funding to build the facility.
- **Feedstocks** – The primary materials and other critical inputs that the facility will transform into one or more energy products.
- **Technology** – The equipment used to transform feedstocks into energy products.
- **Offtake** – The sales agreements with the purchasers of the energy products produced.
- **Site** – The specific real estate where the facility will be located.
- **Funding** - The money needed to design, build, commission and begin operations of the facility. There are several successively larger injections of Funding needed to develop a renewable energy project from its **Pre-Development Stage** all the way through its **Development Stage** and beyond into its ongoing operation.



Of all of the elements, final project funding (meaning the money invested to actually build the facility) is always the last wedge of the pie to fit into place. All the other elements of the project must already be “in place” (usually meaning fully contracted) before final project funding can be obtained. A far smaller amount of money will have to be invested in the project early on in order to cover the expense of bringing all of the elements together into a coherent package that will attract the much larger amount needed for construction of the plant.

The **Team Leader** and the **Project Team** is the first element that must be identified and at least partially organized at the very beginning of a new renewable energy project. The team is responsible for identifying and organizing all the rest of the project elements. Throughout the development process, the team has to deal with all of the rest of the elements simultaneously and bring them into progressively tighter focus. Until all of the final financial documents and all agreements have been signed, any of the six project elements can and often do change suddenly and have to be nudged back into place. In fact, the project team should count on having to continuously adjust and rework the six elements of the project and all of their assumptions and agreements until final contracting and full funding is achieved. This work is lengthy and requires much dedication and perseverance. Any project can “fall apart and melt down” a number of times before full funding is achieved and most do. The project development team should realize that nothing is “real” until the money needed to build the facility is quite literally “in the bank.”

The graphic also depicts important decision points the team will face during the project development process. At these decision points the team must ask itself if it should spend the time, money and emotional energy necessary to produce the three essential business document needed to advance to project to the next stage. These decisions are whether or not to first write a robust **Feasibility Study**, followed by the decision to write a formal **Business Plan**, and finally the decision to write a **Financial Offering**, which must be in full compliance with Security and Exchange Commission and IRS regulations. Practically speaking, if the

team has decided to take the second major step of writing a business plan, it usually feels confident enough of its concept to take the project all the way through the third step of writing an offering. However, just before it writes an offering, the team should conduct another review and recommit itself to the project. The work load and time involved in writing and selling an offering requires is usually massive and requires a very serious intent to push through all obstacles that will arrive no matter what.

These three essential project development documents are each complex, lengthy, have specific formats and must be carefully prepared to comply with all legal requirements. Depending on the stage in the development process and depending on who the team is approaching for funding, each document must carefully follow all of the rules, regulations and legal requirements of the city, county, state and nation where the plant will be located. Because the workload is extensive and because of the expense and legal liabilities involved, each of the three decision points represented by the arrows in the graphic is serious indeed.

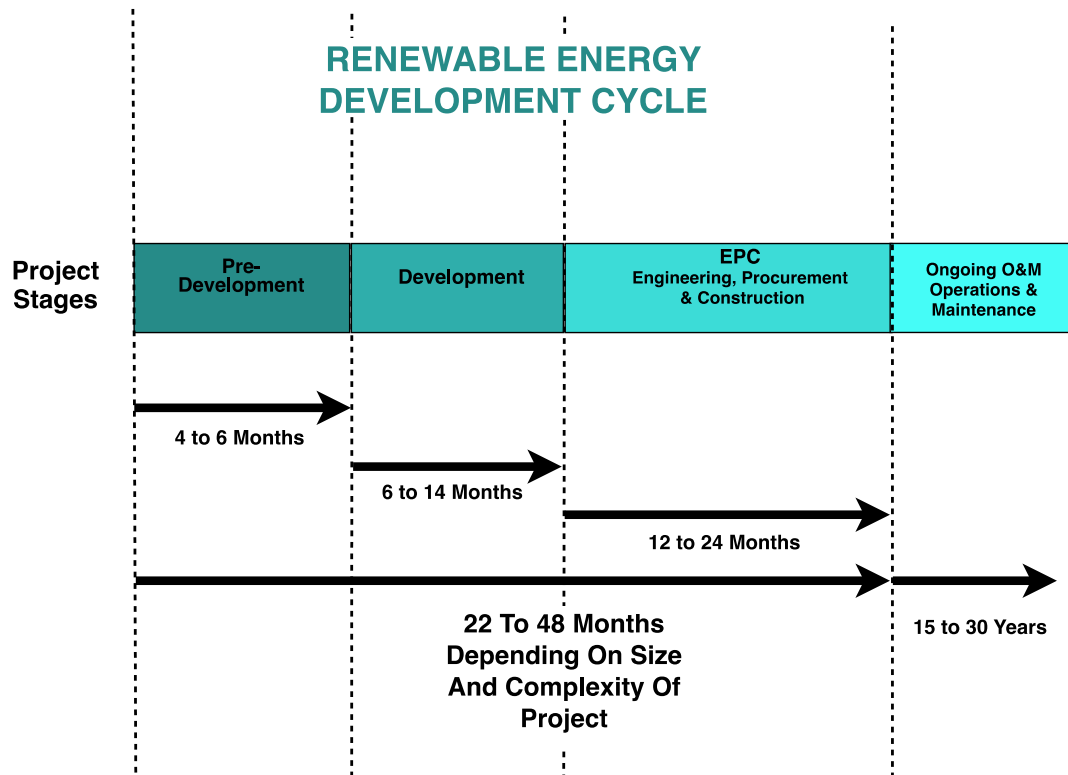
A robust feasibility study, a business plan and an offering are not the only legal documents that will be necessary to prepare for a renewable energy project. Larger projects may have dozens of organizational, management, engineering, consulting, permitting, sales, feedstock supply, real estate, construction, procurement and other types of contracts, agreements and understandings. All must be negotiated and written with the assistance of appropriate legal and financial counsel and oversight. Many energy projects fail to attract funding because one or more contract or document is missing or improperly prepared. No detail of any contract can be ignored or overlooked.

Renewable Energy Project Development – The Development Cycle:

In the graphic below, the stages and average time frames of a renewable energy project are depicted. Much if not most of the project team's work is accomplished in the first two stages of **Pre-Development** and **Development**. This is when the team will be operating substantially on its own. As a project evolves through the second development stage, more and more outside experts and assistance will be required but, the team is still the driving force behind the project.

Project team oversight will be required during the third **EPC** (Engineering, Procurement & Construction) stage of a project's life as well. While the team may have the expertise and intention to design and build the plant, this is rarely done especially for larger projects. EPC work is usually highly complex and so is contracted out to a specialized EPC engineering firm.

The team will also have to decide whether it wants to contract with a specialized **O&M** (Operation & Maintenance) engineering company to run the facility or if it intends to operate and maintain the facility itself once it is built and commissioned for continued use. Some engineering firms do both EPC and O&M work.

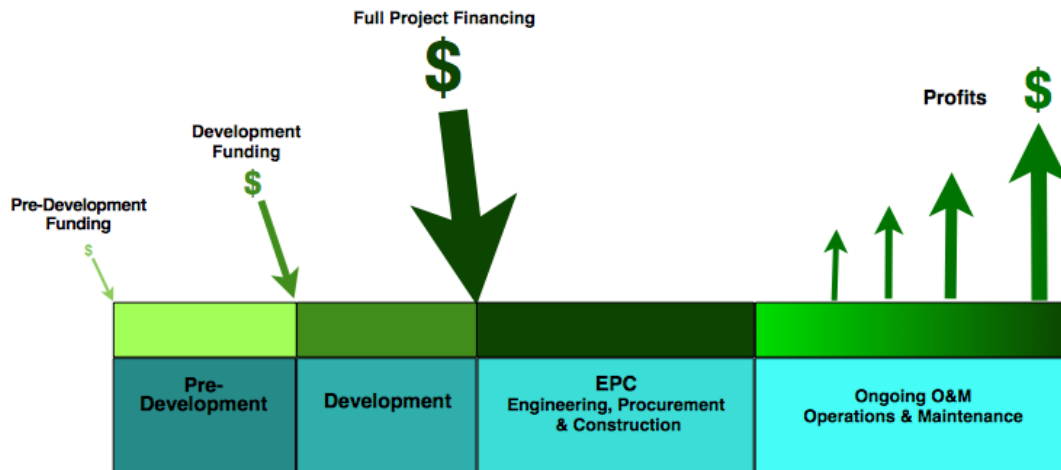


Any of the stages above could be accomplished in less time. However, experienced renewable energy project developers will almost always advise new project teams to plan on each stage taking significantly longer to accomplish than they originally expect.

Renewable Energy Project Development – Sources and Timing of Project Funding:

Some of the potential sources of and the timing of infusions of development capital and project investment are depicted below.

SOURCE & TIMING OF PROJECT FUNDS



Pre-Development Funding: May come from Development team, from friends and or family members, from venture capital investors, or others.

Development Funding: May come from venture capital investors, individual investors interested in the project, grants or other sources.

Full Project Financing: May come from or a combination of venture capital investors, individual investors interested in the project, banks, grants, loan guarantees, investment firms and or a wide variety of other project investment sources.

Pre-Development Funding: Pre-development working capital is often needed to write a project's feasibility study and to write a business plan. Project pre-development takes time and out of pocket expenses, which can mount up significantly. Often these funds come from the project team members, from friends and family members, grants and more rarely from venture capital firms or individuals that specialize in "early-in" project financing. If the funds come from such venture capital sources, the project team must be willing to give them a large percentage of the overall project's ownership shares or "points." This is because the first money "in" a project is the most "at risk." of being lost and never recovered. Quite often, for any number of reasons, a project does not make it all the way through the development process and so the money spent during the pre-development stage is never recovered from project profits. Long experience has taught sophisticated investors that pre-development capital is most often never recovered.

The green arrow at the left of the graphic showing pre-development funding is small because the costs associated with writing a feasibility study and a business plan is proportionally a much smaller amount than that required to move a project through the development stage. Most feasibility studies and business plans range in cost from the out of pocket expenses of a few thousand dollars to as much as \$50,000. The objective of the project team during the pre-development stage of the cycle is to hold down costs to the bare minimum required.

Development Funding: A much larger infusion of capital is needed to begin formal project development, which is based on the project business plan. This money is used to create and formalize all of the many project agreements, designs, marketing plans, EPC plans and operation plans, etc. Development funding is used to bring the project to its “Fully Financed” stage. While there are no hard and fast rules, a useful rule of thumb for the amount of development money a team will require to raise the full project financing for the project is usually somewhere between 2 to 6 % of that total project costs. So for example, for a project with a total project “installed cost” of up to \$20 million dollars, Pre-Development and Development costs could range between \$500,000 and \$3,000,000. In a one two million dollar project Development cost could range from \$150,000 to \$300,000.

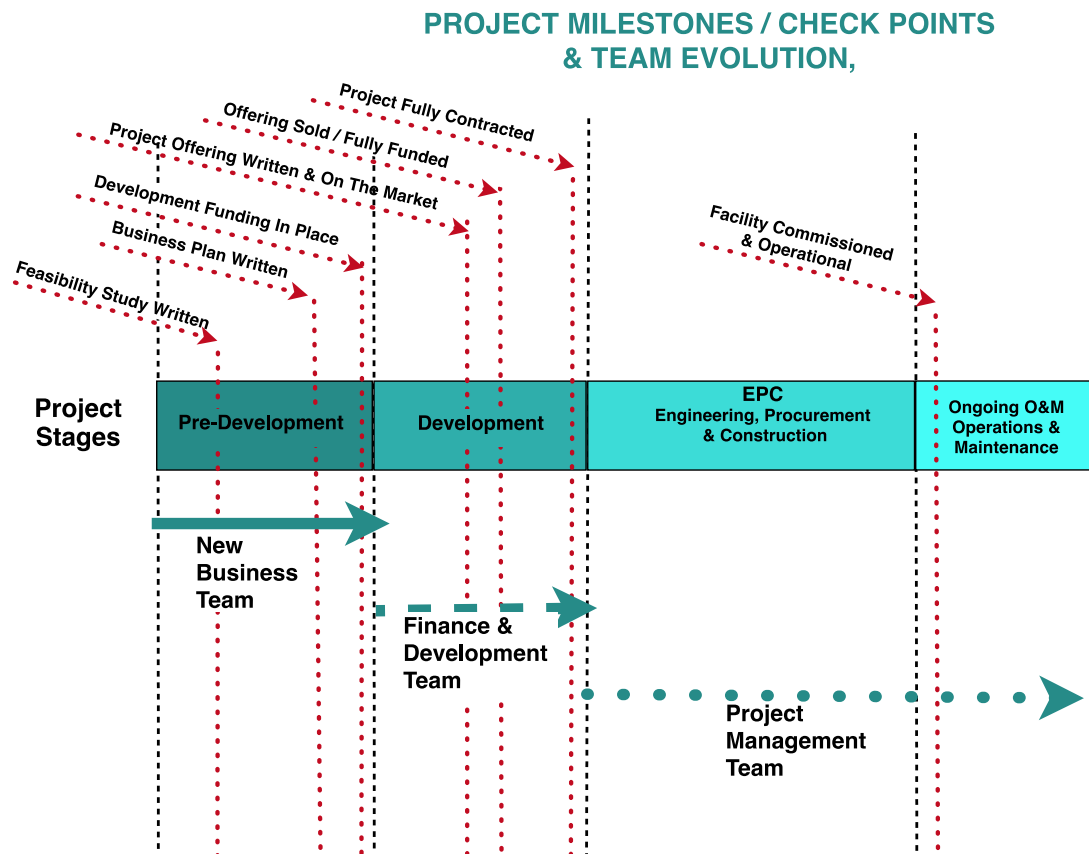
As with pre-development funding, development stage funding is hard to get and is usually expensive to the project. This much money is simply out of reach for most local groups of people wanting to start a clean-energy project. To get it, especially for first timers, a project team will once again have to be “generous” to the investors. This stands to reason as development money is also at high risk. However, the fact remains that it takes money to research, negotiate, write, re-write and pay for the accounting and legal review of all of the comprehensive agreements and plans for a renewable energy project.

The Development team should carefully calculate how much investment capital it will really take to secure full project funding and build in a healthy contingency fund. One of the most common mistakes made by new teams is to under calculate development costs, try to “shoe string it” and then run out of money short of their goal of full project financing. It’s very hard to go back to early-in investors for more money to finish the development stage once the team has under calculated its capital requirements. Quite logically they will see that as the team’s lack of knowledge about the project and or its inexperience in handling business and financial matters.

Full Project Financing: Full project financing is the goal of a renewable energy project development team. This is the total amount of capital needed to actually do all of the work stipulated in the plans, contracts and agreements that were outlined and written during the development stage of the project’s development cycle. This is the money needed for EPC, for facility testing and commissioning and for the first few years of operations until the project begins to make a return for its investors. Raising full project financing requires that all of the pre-development and development activities have been successfully accomplished. This is because the exact amount of capital that will be needed for full project financing cannot be definitively determined until all of the steps leading up to and through the writing of the project’s Financial Offering have been done.

Full project financing is by far the largest sum the team will have to calculate and raise. While all new project investment capital is considered “high risk,” full project financing is the “lowest risk” money invested in a renewable energy project for one simple reason. It will not be invested into the project until the individuals and or institutions that have it to give are convinced that the team knows how to do what it wants to do, that the project has been carefully planned and clearly contracted and that the needed expertise to carry out the plan has been assembled. The investors must believe that the products produced have been pre-sold or will be sold at the expected price, that the facility managers will and can perform as stipulated in their contracts and all many other risk factors involved in any new business have been identified and plans made to mitigate those risks to their satisfaction.

Renewable Energy Project Development – Project Milestones / Checkpoints & Team Evolution:



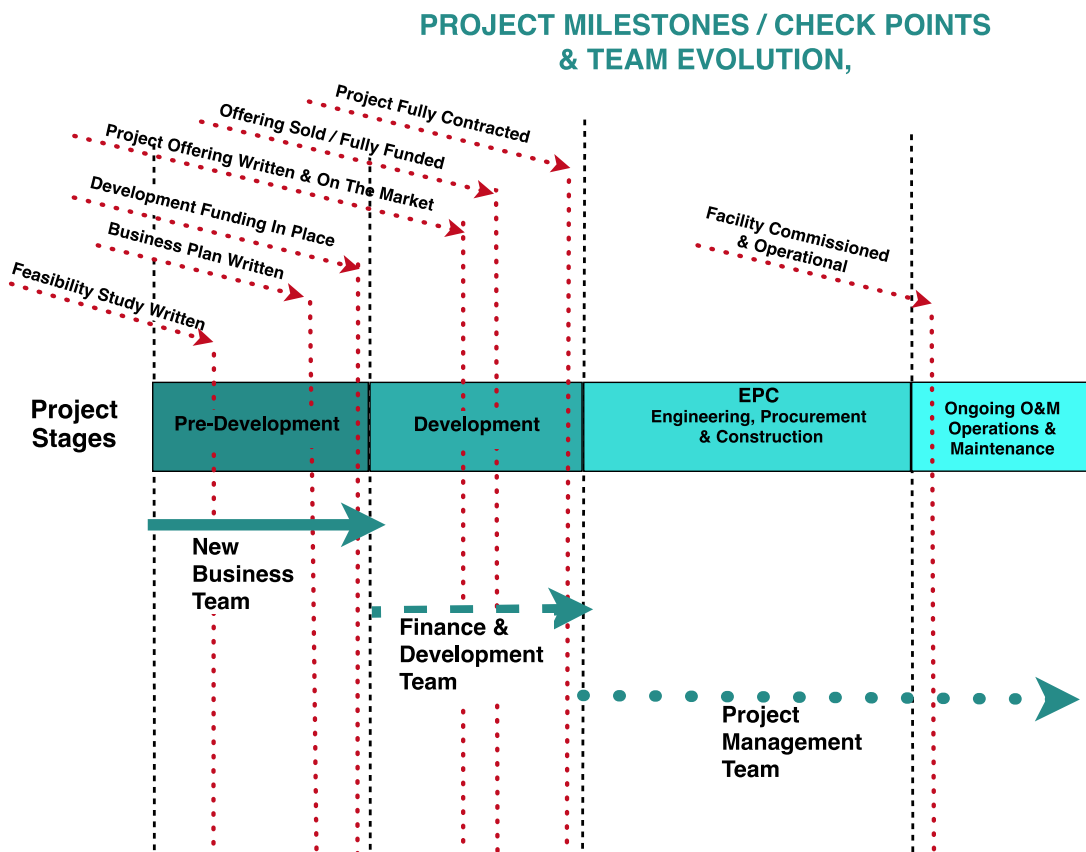
As mentioned above, before each successive stage of project development is reached, a decision to proceed or stop must be made. For instance, somewhere in mid Pre - Development Stage when a project is largely conceptual, the project team has to decide to take the project to the next level of commitment and produce a robust feasibility study or let it all go. The goal is to find out if the project might work. The feasibility study can be used to attract more money needed to write a comprehensive business plan. Sometimes enough pre-development money is raised at the outset to write both the feasibility study and the business plan.

However it is paid for, once completed the business plan is then “put on the market” with the intent to attract early-in project development investors.

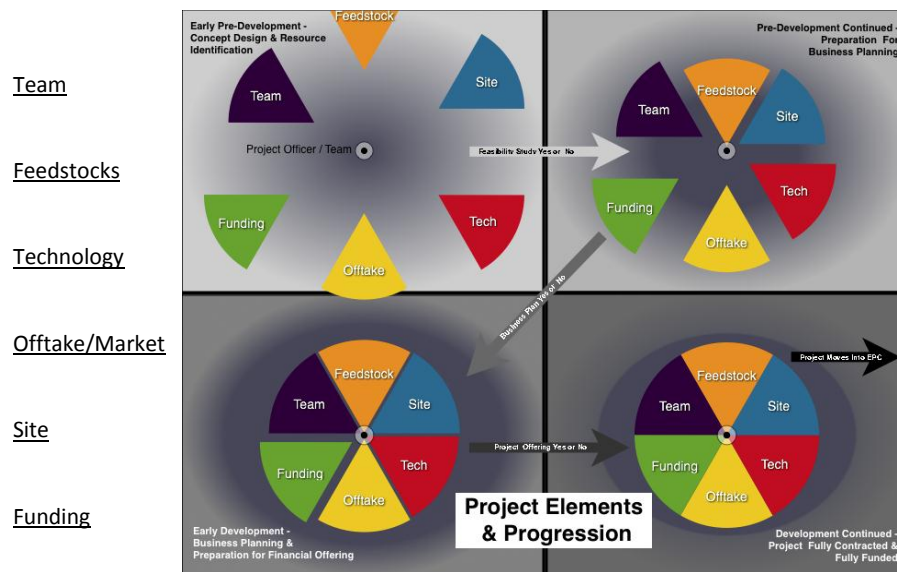
During the pre-development stage, the project team can be described as a **New Business Team**. The team literally dreams up an idea for a business with lots of brainstorming and research. Ideas fly back and forth and a concept of a possible business is imagined and then checked against the reality on the ground. The idea is re-imagined and researched again; often many times. This continues until a fairly clean concept of what may be possible is achieved. Money. Once the business plan has been “marketed” to project development investors and development funding raised, the team has entered the “Development Stage.”

When the business plan has been “sold” and the project has procured its Development Stage funding the entire development team shifts the nature of its work and becomes a **Finance and Development Team**. The team then begins to research write and negotiate the “deal points and details of the contracts and agreements for the specific feedstock and offtake agreements, technology purchases, site agreements, team structure and management plans, marketing plans, in short, everything needed to start a business. This work culminates in formal project offering documents. The set of formal documents called the “Project Offering” is written according to specific SEC and IRS rules and regulations. It is “put on the market” to qualified investors as a business “opportunity.” Once sources for EPC financing have been contacted and have expressed interest in proceeding, the negotiating and contracting process proceeds until the project agreements are all signed and EPC funds are in place. Then the Development process is complete and the EPC process is ready to begin.

At this point the emphasis of the project team once again shifts and it becomes a More of a **Project Management Team**. Its primary work at this point is to oversee the spending of project development funding to get the planned facility actually built and operating.



I. THE SIX ESSENTIAL PROJECT ELEMENTS



Business Development Analysis Model

TEAM ANALYSIS

TECHNOLOGY PACKAGE ANALYSIS

FEEDSTOCK & INPUTS

SITE

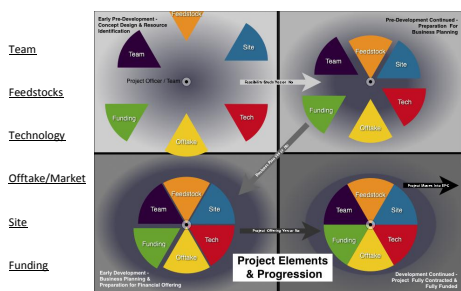
OFFTAKE OPPORTUNITIES / MARKET

FUNDING / FINANCING

EXAMPLES OF SUPPORT

Business Development Analysis Model

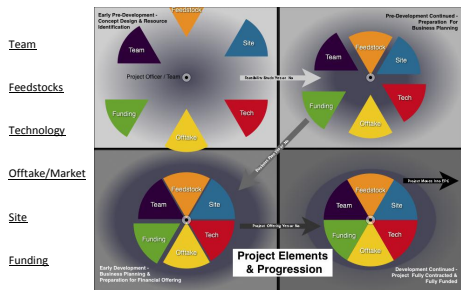
I. THE SIX ESSENTIAL PROJECT ELEMENTS



TEAM ANALYSIS:

- What are the key team member's roles and/ or skills required of an ideal project development team *for a facility that utilizes this type of technology package?*
- In order to keep the project development processing moving forward, what are the key contracts that must be negotiated and put in place to build and operate a project using this technology?
- What is the number of employees needed to operate a facility using this package and what are the general job descriptions of those operators?

I. THE SIX ESSENTIAL PROJECT ELEMENTS



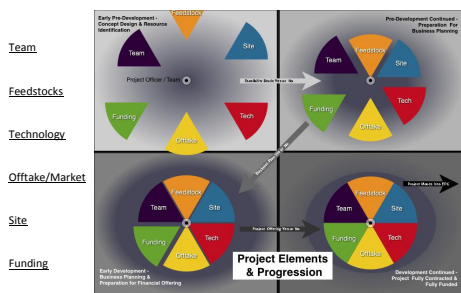
TECHNOLOGY PACKAGE ANALYSIS:

- Which **technology package** / vendor is being used to demonstrate the process being taught?
- What energy product(s) are readily produced by this technology package? e.g. electricity, biodiesel, biogas, heat, biochar
- What products require further processing in this market? (pyro-oil, ethanol, bio-char)
- At commercial scale what are the input requirements for this technology package including, utilities, space requirements, permitting requirements, other inputs like special chemicals and their quantities, other?
- At commercial scale, what feedstocks does this technology package “like”?
- What transportation / delivery considerations must be made for these other inputs?
- What by-products and or wastes streams are produced and how are they disposed of - or even better - **used** in another process and are there ready markets for those “waste” streams?
- What is required to deliver the energy product to market and how would this inform things like site location?
- What is the time required for EPC (Engineering, Procurement and Construction) once the decision has been made to proceed with building the facility and funding is acquired?
- What economies of scale are inherent in utilizing this technology?
- Are there local-scale opportunities?

FEEDSTOCK & INPUTS:

- What are the specific feedstocks & inputs required for this technology package? (focus, criteria for assessing)
- Where are the known feedstocks & inputs for this technology package being taught? (see Appendix for types of sources)
- What are the criteria for assessing feedstock & inputs requirements for this specific type of technology package? (e.g. location, accessibility, availability, distance from processing facility, distance from offtake site, volatility of the feedstock, regulations, political climate, etc.)
- How do these criteria impact site location selection?
- What are the transportation requirements for moving feedstocks from their points of origin to the site of the facility?
- See appendix for more ideas.
- What feedstocks from waste streams are “on the horizon” that would, over time, provide a less expensive, readily available source?

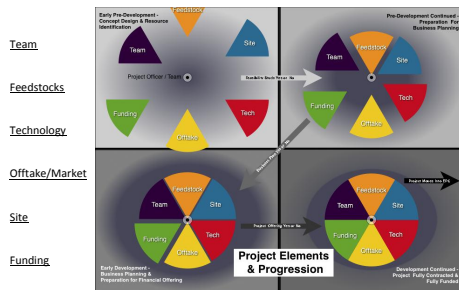
I. THE SIX ESSENTIAL PROJECT ELEMENTS



SITE:

- What are the **criteria** for assessing **site locations** for a commercial facility based on this type of technology package? (e.g size/ footprint, distance from feedstock supply, transportation in and out – major highways, Interstates, rail stops, availability of utilities, permitting issues and requirements, zoning, environmental/ historical issues and requirements, social & political issues, weather, etc.)
- How do transportation requirements for moving feedstocks to the site and the costs of transportation or distribution of the energy product(s) into its market(s) impact site location?
- What are the transportation requirements for moving feedstocks from their points of origin to the site of the facility? How does that impact Site selection?

I. THE SIX ESSENTIAL PROJECT ELEMENTS

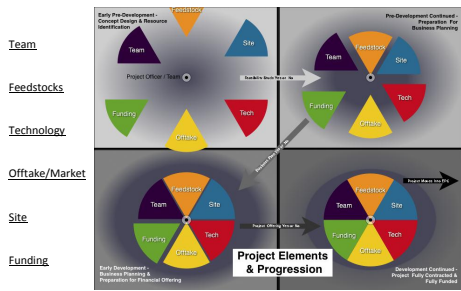


OFFTAKE OPPORTUNITIES /

MARKETS:

- What are the current kinds of **offtake opportunities / markets?** (where, types, quantities, etc.)
- What types of businesses and or organizations, individuals constitute the market(s) for the products that flow from a facility using this technology?
- Are any of those current offtake opportunities local?
- What processes are required to market the product(s) to the customer base, i.e. Requests For Proposal (RFPs), media campaigns, sales force training considerations, etc
- Does a robust target / secondary market now exist for this product or does a market(s) have to be developed?
- What is the scope of the market area for this product, i.e. local, regional, national, international?
- What is the competition for the product that current exists and what is it likely to be in the short-, mid- and long-term?
- From a marketing perspective, what are the advantages and disadvantages of a project that supplies the market with products flowing from a facility using this type of technology?
- See Appendix for ideas.

I. THE SIX ESSENTIAL PROJECT ELEMENTS



FUNDING / FINANCING

- What funding sources appear to be available for this type of facility?
- What offtake or sales agreements are required to get financing?
- What types of financial arrangements and or financial instruments (types of financial contracts) are typical for projects that make the products and use the technology?
- What are the “sweet spots” for funding that you know about? (\$ amount, size of offtake agreements, etc.)
- What is the current market appetite for the products produced and what is the outlook? i.e. unmet needs, market share, over time.

EXAMPLES OF SUPPORT:

- Existing industry / trade associations support such businesses
 - <http://www.biodiesel.org/>
 - www.americanbiogascouncil.org
 - www.NBB.org National Biodiesel Board
- Organizations provide technical support to potential projects
 - [Rural Community Assistance Corporation](http://www.ruralcommunityassistance.org)
- Trade publications support this technology
 - [Algae Industry Magazine](http://www.algaeindustry.com) (graduates of SFCC’s biofuels program)
- Other support
 - [Santa Fe Community College’s ongoing biofuels program](http://www.santafecc.edu/biofuels)
 - [NM Small Business Development Center](http://www.nmsbdc.org) (19 centers)
 - [NM Green Chamber of Commerce](http://www.nmgcc.org)
 - [Workforce Solutions Green Jobs Portal](http://www.workforcesolutions.org/greenjobs)

- [Zero Emissions Research & Initiatives \(ZERI\)](#) is a global network of creative minds seeking solutions to world challenges. The common vision shared by the members of the ZERI family is to view waste as resource and seek solutions using nature's design principles as inspiration.
- **Sustainable Communities NM** – Waste-As-Value Links (WAV-Links) Website under development. info@wavlinks.org

Mission:

2/12/12

We are a hub that identifies and links resources and needs in order to foster bioregional collaboration and economic development by finding value in local and regional waste streams.

We identify, connect, develop and share symbiotic technological, entrepreneurial, market, educational and advocacy resources needed by local businesses and communities to launch successful waste-as-value projects.

These innovative ventures create new jobs in a context of sustainable growth, increasing community self-reliance as the benefits are shared by the bioregion's economies.

Where we are focusing:

We are supporting the creation of small and medium scale businesses and projects supplying, distributing or demanding **local renewable energy and fuels**. Initially utilizing forest-thinning slash as feedstock, we have an eye toward construction and demolition or even landfill wastes as feedstocks. We are focusing on the high value of **liquid fuels and electricity**, while also seeing pellets, composting and local food production as easy linkages. We focus where we live – in **Northern New Mexico** - coordinating people, college workforce training, and compatibly mission-driven groups in a politics- and technology-neutral zone. Through finding solutions to barriers, mapping resources, translating between groups and telling our common story, we are energizing existing efforts.

Why we do this:

We believe that zero waste is possible by following the 3.5 billion years of research and development offered by nature. We see the possibility of all landfills being closed – as cities from Albuquerque to Los Angeles have set as a 2030 goal. We see new businesses, markets and economies created and enhanced by creative new solutions to using what we have been throwing away. We also want to empower ourselves and each other to take steps within our control to influence how we better utilize the resources we have at hand. By collaborating well, we bootstrap with each other to provide benefits to all who would join in... and our entire community... in a way that our local economy will grow on its own... deeply utilizing our local creativities, youth and locally-owned businesses, creating high-value jobs of the future – right here.

Appendix: Business Development Analysis Model

FEEDSTOCK / INPUT SOURCES: EXAMPLES

DIVERTABLE MUNICIPAL SOLID WASTE

KNOW YOUR DISCARDS VALUE

OFFTAKE OPPORTUNITIES / MARKETS: EXAMPLES

APPENDIX

FEEDSTOCK / INPUT SOURCES: EXAMPLES

- **FARM / RANCH / RURAL / FOREST**
 - Crops, i.e.
 - Corn
 - Sorghum
 - Tree FARMS (NOT “harvesting” forests)
 - Crop Wastes, i.e.
 - Corn stalks, husks
 - Livestock Wastes, i.e.
 - Manure – dairy & pig farms
 - Animal offal – bones, etc. from meat processing
 - Forest / Land RESTORATION Wastes
 - Not Harvest
 - Restorative efforts by USDA, Forest Service, Private Land Owners
- **MINING / DRILLING**
 - Brackish Water
 - Water with chemicals
- **URBAN WASTES**
 - “Dry” = Diverted Municipal Solid Waste (see below for full list)
 - paper
 - plant
 - putrescibles
 - polymers
 - textiles
 - chemicals
 - “Wet” or liquid
 - sewage solids
 - brackish water
 - waste oils/fats – automotive, vegetable, animal

DIVERTABLE MUNICIPAL SOLID WASTE	
1. Reusables	3. Plant Debris
Working large appliances	Leaves & Grass
Working small appliances	Prunings and trimmings
Durable plastic	Large branches & stumps
Usable textiles and leather	4. Putrescibles
Usable furniture	Vegetative food scraps
Usable mattresses	Fish and meat waste
Used books and catalogs	Compostable paper
Used building materials	Sewage sludge and manures
Other bulky items	5. Wood
Other reusables / repairables	Untreated wood
2. Paper	Treated wood
Cardboard	6. Ceramics
White ledger	Concrete
Newsprint	Asphalt paving
Magazines / catalogs	Mixed C&D
Other office paper	
Paperboard	
Composite paper and plastic	

7. Soils	Other plastics
Gypsum wallboard	Carpet
Fines (including rocks and dirt)	Carpet padding
8. Metals	Tires
Aluminum cans	Asphalt Roofing
Steel cans	11. Textiles
Ferrous metals	Poly fibers
Non-ferrous metals	Cotton and wool
Non-working appliances	12. Chemicals and Ewaste
Auto bodies, engines and motors	Batteries
9. Glass	Motor oil, filters & other auto fluids
Clear glass	Paint
Colored glass	Fluorescent lights
Mixed glass	Pharmaceuticals
Window (flat) glass	Other household hazardous wastes
10. Polymers	Disposable diapers /hygiene items
# 1 PET (CRV) containers	Treated medical waste & syringes
#1 PET containers	Treated wood
#2 HDPE (CRV) containers	Brown goods
#2 HDPE containers (e.g., milk jugs)	Computers and peripherals
#4 LDPE Film, plastic bags	TVs and Monitors

SOURCE: Richard Anthony, Resource Management in the New Millennium, 2005,
http://www.richardanthonyassociates.com/presentations/rm_2005.ppt

Know Your Discards Value

Material	% in Wastes	Value (\$/ton)
Reusables	6%	\$400
Putrescibles	26%	\$35
Paper	21%	\$100
Ceramics (C&D)	10%	\$15
Metals	9%	\$80
Polymers	9%	\$150
Soils	6%	\$15
Glass	4%	\$25
Textiles	3%	\$20
Plant Debris	3%	\$35
Wood	2%	\$15
Chemicals	1%	\$200

Richard Anthony, Resource Management in the New Millennium, 2005,
http://www.richardanthonyassociates.com/presentations/rm_2005.ppt

OFFTAKE OPPORTUNITIES / MARKETS: EXAMPLES

- Biodiesel
 - Ranchers / Farmers / Loggers / Miners – trucks, tractors, generators, equipment, etc.
 - Regional Refineries - blended
 - “Urban” pumps
 - Truck Fleets
 - Government fleets, school buses
 - Further processing: plastics
- Bio-gas
 - Burn to power the bio-gas process
 - Burn for electricity
 - To power to another process
- Electricity
 - Individual projects – for one building, etc.
 - Clusters of related buildings – school campus
 - Back to the grid – rural coops, etc.
 - New electricity utility
- Bio-char
 - Land restoration
 - Agricultural soil amendment
 - Burn for electricity
 - Pelletize for pellet stoves
- Ethanol
 - Some engines “as is”
 - Local / regional refiners for blending with gasoline for
 - E10, E15, E85 flex fuels
 - Solvent
 - Pesticide products
 - Drinking alcohol
 - Process can also be used to make essential oils and fragrances using different feedstocks
- Algae: lipids, oils, whole cells....many, many products
 - Human food/ nutraceuticals/spirulinas
 - Livestock supplement to food
 - Further process in many other technologies
 - Pyrolysis
 - Bio-gas
 - Electricity
 - Ethanol
 - Plastics
- Where possible, refine liquid fuels for a natural gas replacement to reduce pressure for fracking as a source.

Business Development Module – PowerPoint Presentation Outline

Below are two PowerPoint presentations to copy and paste into each curriculum.
The first one is the 30-minute section and the second one is the 45-60 minute section.

30 Minute Introduction to Business Development –

FOR AT/NEAR THE BEGINNING OF EACH WORKSHOP
Lesson/Lecture format for teacher/student manual

Learning Objectives: teacher's manual

- Teacher's manual consists of student manual, plus printout of slides with notes

Learning Objectives (for 30-minute section)

- Introduction to key concepts in In Depth section
- Introduction to the concept of entrepreneurship for the industry
- How to identify (local) opportunities for entrepreneurship
- “Back of the Napkin” Feasibility Study introduction

Key Terminology

- Business Development
- Entrepreneurship
- Zero Waste
- Feasibility Study
- Feedstock & Offtake Opportunities
- Feasibility Study

Supplemental Materials –

- Handouts (same for both sections)
 - Business Development Analysis Model
 - Project Development Process Explanation

Classroom Props & Activities

- Class Overview: student manual
- Student manual consists of
- Slides printed as handout
- With supplemental materials listed above

Activities

- Discussion of feedstock, market/offtake opportunities

45-60 Minute in Depth Introduction to Business Development –

FOR NEAR/AT THE END OF EACH WORKSHOP

Lesson/Lecture format for teacher/student manual

Learning Objectives: teacher's manual

- Teacher's manual consists of student manual, plus printout of slides with notes

Learning objectives (for 45-60 minute section)

- The four stages of the project development cycle
- The six elements of a renewable energy project
- The three Master Documents of a successful project
- Create a “back of the napkin” feasibility study containing the six elements of a renewable energy project

Key Terminology

- Six essential project elements:
 - Team
 - Feedstocks
 - Technology
 - Offtake/Market
 - Site
 - Funding
- Four stages of Project Development
 - Pre-Development
 - Development
 - EPC: Engineering, Procurement & Construction
 - Ongoing O&M (Operations and Management)
- Three Project Development Master Documents
 - Feasibility Study
 - Business Plan
 - Financial Offering.

Supplemental Materials – Handouts (same for both sections)

- Business Development Analysis Model
- Project Development Process Explanation

Classroom Props & Activities

- Class Overview: student manual
- Student manual consists of
- Slides printed as handout
- With supplemental materials listed above

Activities

- Each trainee will create a “back-of-the napkin” feasibility study
- Attendees will present and discuss their ideas and results.

30 Minute Introduction to Business Development –

PowerPoint Presentation Slides:

BCX RENEWABLE ENERGY BUSINESS DEVELOPMENT CURRICULUM

A Brief Introduction To The Development Process Of Renewable Energy Projects

10 To 15 Minute Presentation For
The First Class Of Each Module

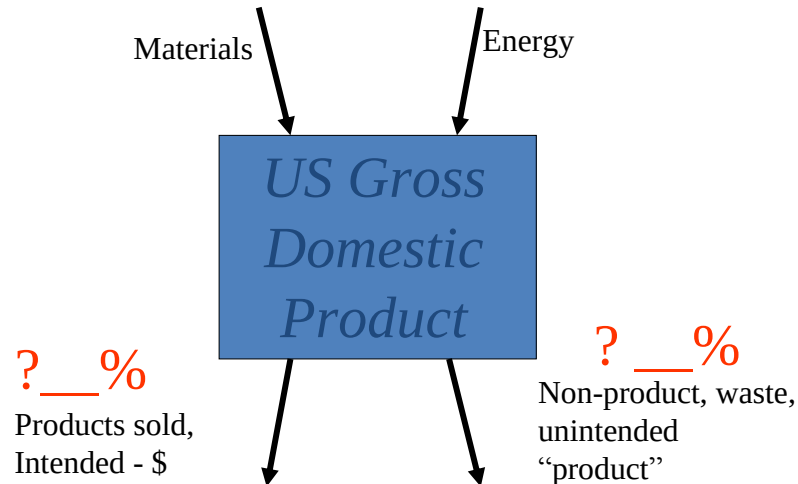
Biofuels Technologies and You

- Biofuels industry is new in New Mexico
- Not many jobs yet
- Entrepreneur? See if you are interested in starting your own
- Learn how to be a better employee in this new industry
- Where are local feedstocks you already know about?
- Where are local / regional markets for your biofuels product(s)?

Overview

- Here we'll give you an overview of the issues and opportunities that we'll cover in more detail at the end of this workshop.
- Be thinking about where there may be opportunities for YOU to start a profitable business in the biofuels industry, using the technology you're learning today.
- At the end, you'll be coming up with a sketch of a feasibility study for your idea.

What do YOU think?



Gross Domestic Product = **Gross domestic product (GDP)** refers to the market value of all officially recognized final goods and services produced within a country in a given period.. *Wikipedia*

Of all the materials and energy that go into the US Gross Domestic Product, what percentage go into what we sell (and measure in dollars), and what percentage are waste, non-product or unintended product?

Answer: 6% Products sold. 94% non-product or waste

DATA SOURCE: "In the United States 10 tons of active mass raw materials (not including construction materials) per person is extracted from U.S. territory by the economy. Roughly 75% is mineral and non-renewable while 25% is, in principle, from renewable sources. 6% of the total is embodied in durable products. The other 94% is converted into waste residuals as fast as it is extracted. . . ." The tonnages of waste residuals are actually greater than the tonnages of crops, timber, fuels and minerals (because air and water contribute mass to the residuals)"

"The annual accumulation of active materials embodied in durables...is probably not above ... 6% of the total." Ayres, R.U., Kneese, A.V. 1989 *Externalities, Economics, & Thermodynamics*, in Archibugi & Nijkamp, eds, *Economy and Ecology: Towards Sustainable Development*. pp 109-117. Kluweracademie Pubs, Netherlands.

Biofuels Feedstocks

- Feedstock = Raw material
 - Wild harvest
 - Crops
 - Wastes – feedstocks of the new clean economy
- 94% waste - finding value in wastes for biofuels
- More local / regional
- Transportation costs as limiting factor
- Small to medium sized scaled
- Scale of accumulation and handling of feedstocks
- Biofuels as a higher-value product from wastes

Opportunity to find feedstocks for biofuels in current local ‘wastes’. Wastes are generally “local”.

While transportation costs may be lower, there are other variables for costs for such “new” scales of commercialized technologies.

Different scales and economies of scale when producing more locally and regionally.

Transportation, accumulation and handling costs of feedstocks vary from large-scale mass production.

When using feedstocks for biofuels, we are converting wastes to a higher value product than many others.

Founding Theories

- Zero Waste
- Five Kingdom/Four Design Principles
- ***Biofuel industry is a practical manifestation of these sustainable business philosophies!***

Zero Waste Principles: 5 Kingdoms

- 5 Kingdoms of Nature:
 - Bacteria (Anaerobic/Aerobic)
 - Algae (Protista) e.g. Spirulina
 - Plants (coevolved with fungi)
 - Fungi
 - Animals (many coevolved with bacteria)
- *Or many ways we make things – industrial / uses*

Zero Waste Principles developed by Gunter Pauli and used around the world. His organization = ZERI = Zero Emissions Research & Initiatives (ZERI) is a global network of creative minds seeking solutions to world challenges. The common vision shared by the members of the ZERI family is to view waste as resource and seek solutions using nature's design principles as inspiration.

Based on 3.5 billion years of research and development. These principles show how we can have diversity of life thriving on the planet.

The Green Bullets at the bottom of the slides extrapolate his natural systems principles into an industrial / technological interpretation:

On this slide, the many industrial uses for “wastes” are similar to the 5 kingdoms of nature and the diversity of species within those five kingdoms.

Four Design Principles

- **1st:** No kingdom eats its own waste.
 - Toxin
 - Degenerative (e.g. mad cow disease)
 - *Industrial/uses: Each industry/use has its own wastes*
- **2nd:** Whatever is a toxin for one kingdom will be neutral or a nutrient for another species in at least one other kingdom.
 - *Industrial/uses: another industry/use can use/find value in the wastes from the others.*

1st: No matter how efficient a system is, it is going to have wastes. Feeding back ground-up cow offal to cows has exacerbated mad cow disease.

2nd: What is waste for one industry (including many of the known feedstocks for biofuels) is a valuable feedstock for another – in this case biofuels.

Four Design Principles

- 3rd: Systems are more efficient and more resilient, the more diverse and the more local they are operating.
 - *Industry/uses: the more diverse and the more local the business are, the more likely our economy is efficient and resilient.*
- 4th: When all 5 kingdoms cooperate, everything can be integrated and separated at ambient pressure and temperature.
 - *Industry/uses: The solutions are often less energy-dependent (cost) than we may initially see.*

3rd: In nature diverse and local systems are more resilient and efficient. For example, non-native plants can dramatically alter a local ecosystem.

In industry, our economies are more resilient and efficient when they are more local and diverse. This has changed in the last 100 years. These local biofuels projects can assist our bioregional economy to be more resilient and efficient.

For example, by using our local wastes to create biofuels, we become less dependent on foreign oil (natural security), and more local-food secure (e.g. fuels for farming and transportation, processing and cold storage.)

4th: Very often, there are solutions that take less energy. We look to physics and chemistry for many technologies. And often not to biology. Biofuels technologies are in a unique position to bridge these three main “places to look for solutions”: chemistry, physics, biology. Biology solves problems at ambient temperature and pressure – as it does in nature.

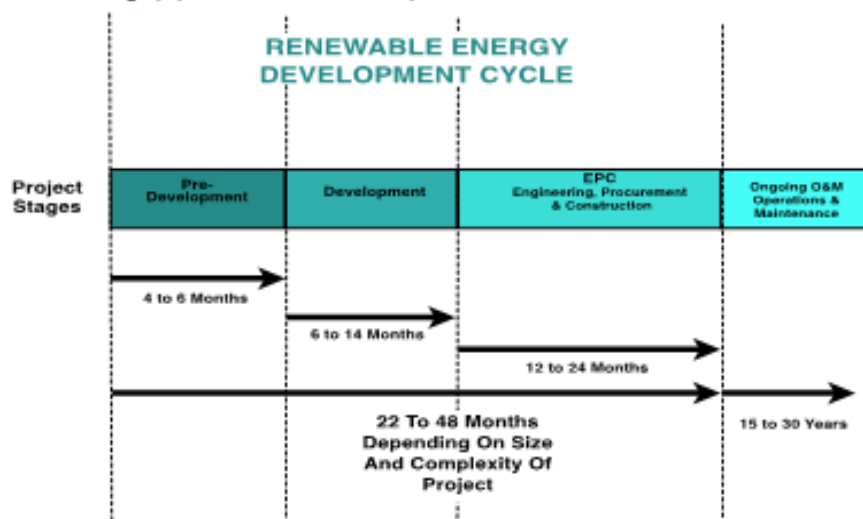
LESSON OVERVIEW

RENEWABLE ENERGY PROJECT DEVELOPMENT

- I. THE FOUR STAGES OF THE PROJECT DEVELOPMENT CYCLE
- I. THE SIX ESSENTIAL PROJECT ELEMENTS
- I. THE THREE PROJECT DEVELOPMENT MASTER DOCUMENTS

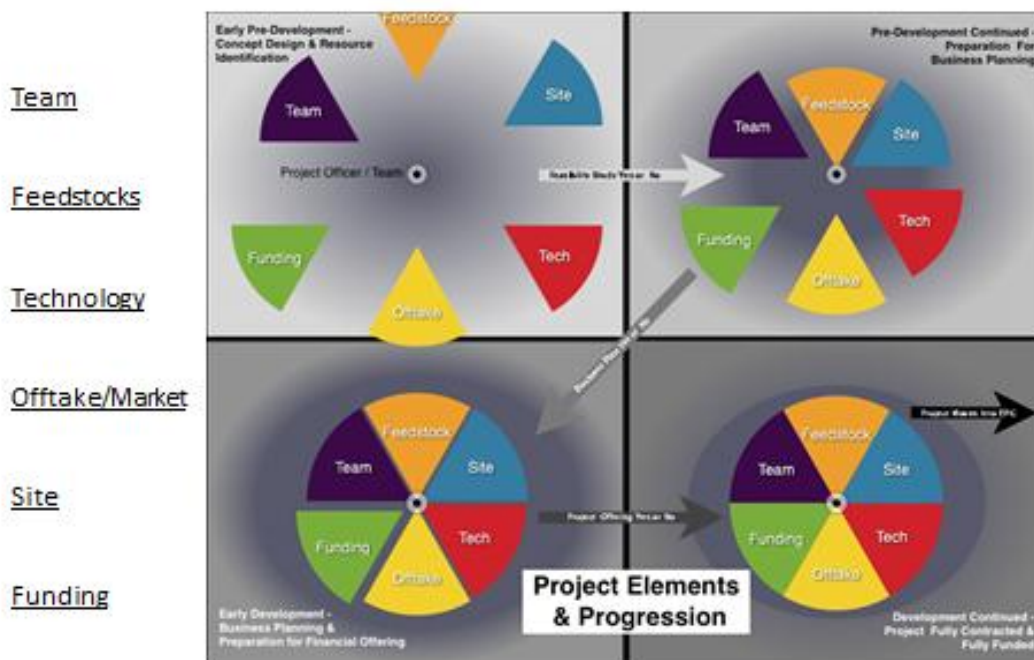
I. THE PROJECT DEVELOPMENT CYCLE

- The Pre-Development Stage (Project Conceptualization, Initial Research, Initial Fundraising)
- The Development Stage (Deep Research, Business Planning, Major Fund Raising)
- The EPG Stage (Engineering, Procurement, Construction)
- The O&M Stage (Operations & Maintenance)



Instructor notes: Take a few moments to examine the graphic. Discuss the stages of the development cycle and what is meant by EPC and O&M. Explain that the time frames given for each stage are averages and that each stage may take more or less time depending of difficulties encountered during each stage, challenges that must be overcome or other unexpected delays. It can take less time to move through a stage but this is a rarity. Almost always each stage takes longer than expected to accomplish.

II. THE SIX ESSENTIAL PROJECT ELEMENTS



Instructor notes: For this short introduction, look briefly at each of the pie wedges representing the six critical elements of any renewable energy project. Notice how the wedges move closer together during the first two stages of development, (pre-development and development.) The idea to convey to the students is that at the very beginning of the development cycle during early pre-development, a project team really does not know much about the project elements or how they will eventually fit together. The project is non-focused and is really only a concept or idea. The team or team leader has not yet deeply researched all of the elements. As the project moves through time, the team learns more about each element and the project moves into tighter and clearer focus. For the purposes of the introduction that is really all detail the instructor needs to deliver about the six elements. Later in the longer version of this material this graphic will be examined in much greater detail.

II. THE SIX ESSENTIAL PROJECT ELEMENTS

- Team - The Group Of People That Together Develop A Renewable Energy Project
- Feedstocks - The Primary Materials Used As Fuel Or Inputs In A Project (Wood, Waste Materials, Etc.)
- Technology - The Technology And Processes Used To Transform The Feedstocks Into Energy Products (Liquid Fuels, Electricity, Solid Fuels, Etc.)
- Offtake/Market - The Buyer(s) Of The Products Produced (Includes The Idea Of A Single Contract For The Product Such As A Power Purchase Agreement (PPA) For Electricity)
- Site – The location of the facility.
- Funding – The money used to develop the project from its earliest inception all the way through to the facility's construction and commissioning

III. THE PROJECT DEVELOPMENT MASTER DOCUMENTS

Three master documents that a project team writes during the project development cycle are:

- A Project Feasibility Study
- A Project Business Plan
- A Project Financial Offering

Each document is a tool used to raise money needed to move the project to the next stage of development.

Instructor notes: The instructor may briefly describe the three master documents that the team will write or have written at some point during the life cycle of a renewable energy project. These documents are referred to in the first graphic covering the six essential project elements. Here it is important that the student understand that the real objective of each document is to communicate to potential investors the financial benefits of the project.

Each of the documents is basically a refinement of the project concept with progressively more and clearer detail given about each of the six project elements. While the format for each document will be different and the elements covered differently in each, the overall objective of all three documents is always to attract that next level of funding necessary to keep the project moving; ultimately to full project build-out and into operations. Also, the students should understand that the only one of the three documents that the team itself may actually physically write is the first one or the Feasibility Study.

The students will be supplied with a sample feasibility study in their student study and resource materials. The project team may also physically write the business plan and even the final financial offering package. However, often a team will elect to pay a lawyer or professional business plan writer to supply the final actual language of the project's business plan and or its financial offering. However the student should realize that even if someone other than the team or a team member does the actual writing of any of the documents, the entire team will be deeply involved in the process of the document's creation and must supervise its actual writing very closely.

The team must completely and thoroughly understand every word and concept contained in all three documents. The team members will be the ones defending each against the hard and pointed questions that potential investors must and will ask.

Class Activity: Introductory Discussion

- What are some of the feedstocks we know about locally?
- What might be some of the opportunities to sell our product(s) locally?
- Watch for business opportunities that you see during the workshop. Pick one.
- You'll be asked to *sketch out* a Feasibility Study for *your business idea* at the end of the workshop.

45-60 Minute in Depth Introduction to Business Development –

PowerPoint Presentation Slides:

BCX RENEWABLE ENERGY BUSINESS DEVELOPMENT CURRICULUM

**An In-Depth Exploration Of The
Development Process Of Renewable
Energy Projects**

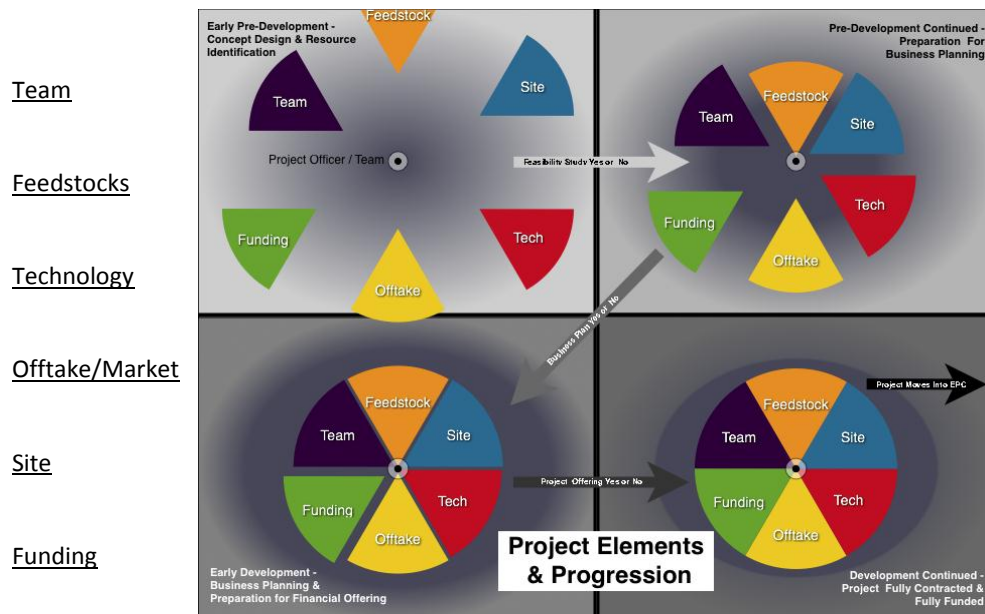
45 To 60 Minute Presentation For
The Last Class Of Each Module

LESSON OVERVIEW

RENEWABLE ENERGY PROJECT DEVELOPMENT

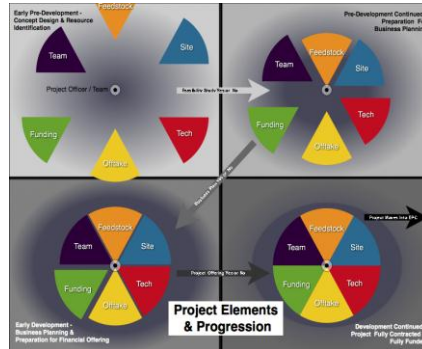
- I. THE SIX ESSENTIAL PROJECT ELEMENTS
- I. THE FOUR STAGES OF THE PROJECT DEVELOPMENT CYCLE
- I. THE THREE PROJECT DEVELOPMENT MASTER DOCUMENTS
- I. PROJECT TEAM EVOLUTION

I. THE SIX ESSENTIAL PROJECT ELEMENTS



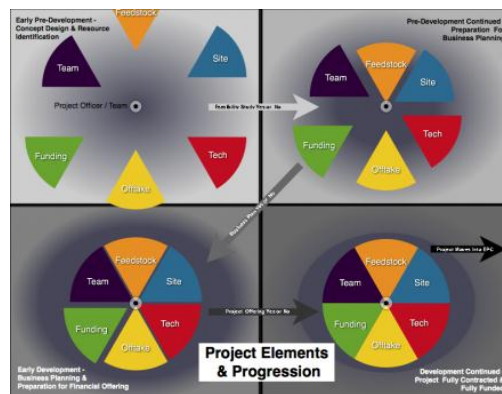
I. THE SIX ESSENTIAL PROJECT ELEMENTS

- Six essential elements are common to all renewable energy projects.
- All six elements must all be “in place,” meaning fully understood, contracted and fully funded before the project can be built and operated.
- Of all of the elements, final project funding (meaning the money invested to actually build the facility) is always the last wedge of the pie to fit into place.
- Until all of the final financial documents and all agreements have been signed, any of the six project elements can and often do change suddenly and have to be nudged back into place.



I. THE SIX ESSENTIAL PROJECT ELEMENTS

- **Team** - The people responsible for the project’s conceptualization leading to a detailed and comprehensive feasibility study, writing or overseeing the writing of a business plan, writing or overseeing the writing of a financial offering, marketing that offering to potential investors and or brokers and securing the funding to build the facility.



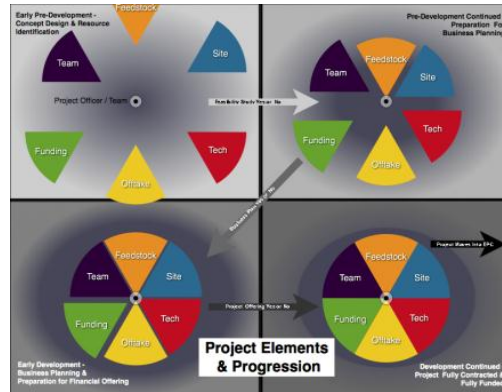
I. THE SIX ESSENTIAL PROJECT ELEMENTS

Feedstocks – The primary materials and other critical inputs that the facility will transform into one or more energy products.

Technology – The equipment used to transform feedstocks into energy products.

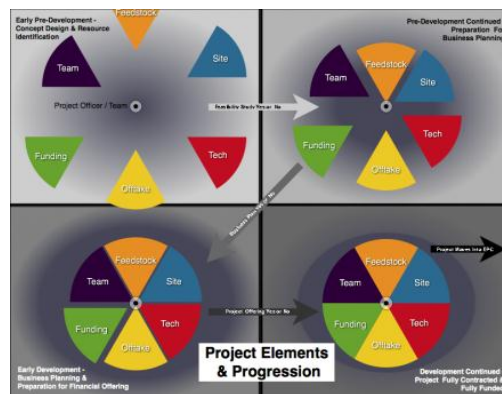
Offtake/Markets – The sales agreements with the purchasers of the energy products produced and or the market the product will be sold into.

Site – The specific real estate where the facility will be located.



I. THE SIX ESSENTIAL PROJECT ELEMENTS

Funding - The money needed to develop, design, build, commission and begin operations of the facility. There are several successively larger injections of Funding needed to develop a renewable energy project from its **Pre-Development Stage** all the way through its **Development Stage** and beyond into its ongoing operation.



I. THE SIX ESSENTIAL PROJECT ELEMENTS

The Project Team

- The team leader is the first element that must be identified and in a best case scenario a project team at least partially organized at the very beginning of a new renewable energy project.
- The project team is considered by most investors to be the most important element of any project.
- Teams usually start out small and add members as the project progresses. Project teams should be kept as small as possible.
- Team members should be selected very carefully according to their knowledge, experience and most importantly their ability to work well with each other under stressful conditions.
- The team members must be flexible and adaptable as a project rarely ends up exactly as it was originally conceived.

I. THE SIX ESSENTIAL PROJECT ELEMENTS

The Project Team

- Throughout the development process, the deals with all of the other project elements simultaneously and brings them into progressively tighter focus.
- The project team should count on having to continuously adjust and rework the six elements of the project and all of their assumptions and agreements until final contracting and full funding is achieved.
- Project development work is complex, lengthy and requires dedication and perseverance. Any project can “fall apart and melt down” a number of times before full funding is achieved and most do.
- The project development team should realize that nothing is “real” until the money needed to build the facility is literally “in the bank.”

I. THE SIX ESSENTIAL PROJECT ELEMENTS

Feedstock

- Feedstock is often considered by most investors to be the second most important element of any renewable energy project.
- Investors are rightly concerned that the supply of feedstock:
 - Really exists and is available in the needed quantities over the expected life of the planned facility without stressing the natural resource base they come from or that causes harm to the natural environment
 - Is available at the quality levels required by the technology selected
 - Is affordable at the quality levels necessary
 - Has been contracted for an acceptable period of time and is therefore considered “secure”
 - Is not overly subject to unexpected supply interruptions
 - Is available from other sources in case of supply interruption
 - That contingency plans have been made in case of supply interruptions
 - Will not be subject to delay or interruption from well-meaning environmental advocates
 - Is located close enough to the point of use to avoid undue transportation “penalties.”
- Unless all of the above criteria and any other investor concerns about feedstocks have been answered to their complete satisfaction a project will not get funded

I. THE SIX ESSENTIAL PROJECT ELEMENTS

The Technology Package

- The technology package selected by the project team is usually considered by potential investors as important as the feedstocks that it will use.
- The term “package” refers to all of the various machines and equipment used in the facility
- The total technology package for most projects can be divided into three parts:
 - The feedstock preparation and handling package, which prepares the feedstock for use by the transformation package and delivers it into the transformation or conversion unit or package
 - The transformation package, which transforms the feedstocks into one or more useable product and byproducts
 - The product storage and handling package which holds and handles the product or products and any by-products until they are delivered to the customer or “Offtaker”
- For most projects, investor prefer that the technology packages selected are considered by the financial community as “commercial,” which means that they have been in use in similar facilities for a number of years or long enough so that they have an established track record of performance. It is then considered, “finance-able.”
- New or “emerging” tech packages that do not have years of proven operation are generally much harder to finance.

I. THE SIX ESSENTIAL PROJECT ELEMENTS

The Technology Package

- The project must balance the overall cost of the technology package against its efficiency and long-term operational robustness.
- The team must anticipate how often the facility will not be in full operation due to regularly scheduled maintenance requirements
- The total package must be chosen specifically for the expected quantity and quality of the feedstocks used
- The technology must be “permit-table” meaning the project team must be able to secure the necessary permits needed for its operation. This is a very important selection requirement as some states and/or communities have much more strict permitting requirements for certain types of technologies than other states or communities.
- The technology selected should be as efficient as possible, meaning it should operate in such a way to take maximum advantage of the feedstock, operate cleanly and safely while maintaining as low an operating and maintenance cost as possible.
- The technology should be selected with careful consideration of the by-products and potentially harmful wastes that are produced and that may cost too much to dispose of or use as an input in some other industrial process

I. THE SIX ESSENTIAL PROJECT ELEMENTS

The Technology Package

- Comprehensive engineering studies created in the latter part of the **Development Stage** will be required before full project financing is achieved and will include
 - Permitting studies for each type of permit required
 - Complete engineering diagrams
 - Construction diagrams
 - Construction schedules
 - Others as required for the project
- All permits must be applied for and received before construction begins
- All EPC and O&M firms that will participate in the project must be identified and contracts negotiated and signed prior to final project funding.

I. THE SIX ESSENTIAL PROJECT ELEMENTS

Offtake / Market

- After Feedstocks and technology considerations, the Offtake or the Market for the product produced is generally the next most important issue the project team must resolve for potential investors.
- Generally, offtake agreements with buyers must be fully negotiated and contracted before a project will receive financing and must include
 - Actual price that will be paid for the product
 - The duration of the contract, generally over an agreed upon number of years
 - Price escalators such as standard cost of living increases, inflation rates, etc.
 - Understanding of unanticipated sales price increases due to cost factors such as increases in transportation, utility or feedstock costs, etc.
 - Product volume levels to be sold to each offtaker
- For some products where a portion of sales will be made to the general public, convincing and comprehensive market analysis, marketing studies and marketing plans will also be required before investors and or financing institutions will put up the required capital for a project

I. THE SIX ESSENTIAL PROJECT ELEMENTS

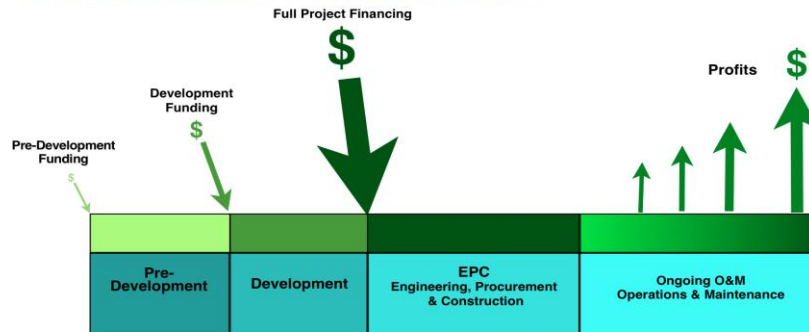
The Project Site

- The project team must select a project site that:
 - Is permit-able. This is a critical consideration as some areas are located close to water sources or environmentally sensitive areas that are protected or areas that are too close to human or wildlife habitats and so are unavailable to some types of technologies
 - Is close enough to major utilities such as water delivery systems and power grids, etc.
 - Is close enough to major transportation infrastructure such as roads, highways and railroads so that feedstocks and finished products can be safely and effectively transported from their sources and to their markets within reasonable cost parameters
 - Is close enough to the source of the needed feedstocks so as to avoid significant additional transportation costs
 - Is close enough to waste disposal sites or other industrial users of the by-products or wastes that may be generated from the technology selected

I. THE SIX ESSENTIAL PROJECT ELEMENTS

Project Funding

SOURCE & TIMING OF PROJECT FUNDS



Pre-Development Funding: May come from Development team, from friends and or family members, from venture capital investors, or others.

Development Funding: May come from venture capital investors, individual investors interested in the project, grants or other sources.

Full Project Financing: May come from or a combination of venture capital investors, individual investors interested in the project, banks, grants, loan guarantees, investment firms and or a wide variety of other project investment sources.

I. THE SIX ESSENTIAL PROJECT ELEMENTS

Project Funding

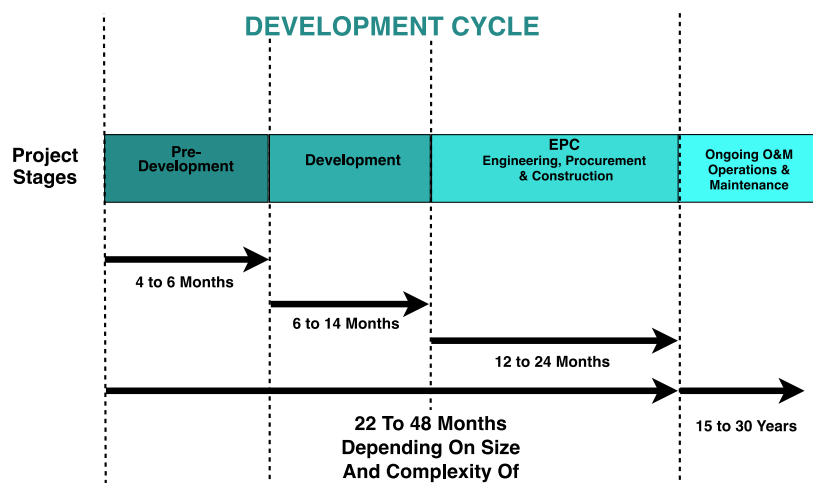
- There are several levels or “rounds” of funding for renewable energy projects that must be raised from investors or project participants during progressive stages of the **Project Development Cycle**:
 - **Pre-Development Funding:** Working capital needed to write a project’s feasibility study and to write a business plan. Project pre-development takes time and out of pocket expenses, which can mount up significantly. Often these funds come from the project team members, from friends and family members, grants and more rarely from venture capital firms or individuals that specialize in “early-in” project financing.
 - **Development Funding:** A larger infusion of capital needed to begin move the project through **the Development Stage** and is used to create and formalize all of the many project agreements, designs, marketing plans, EPC plans and operation plans, etc. Development funding is also used to write the projects Formal Business Offering documents and to market the project to investors for full project financing, the largest funding round in any project. A useful rule of thumb for the amount of development money a team will require to raise the full project financing for the project is usually somewhere between 2 to 6 % of that total project costs.

I. THE SIX ESSENTIAL PROJECT ELEMENTS

Project Funding

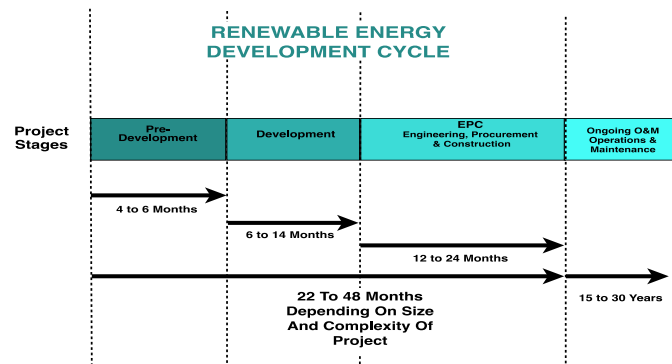
- **Full Project Financing:** Is the total amount of capital needed to actually do all of the work stipulated in the plans, contracts and agreements that were outlined and written during the project's **Development Stage**. This is the money needed for EPC, for facility testing and commissioning and for the first few years of operations until the project begins to make a return for its investors.
 - Raising full project financing requires that all of the pre-development and development activities have been successfully accomplished because total capital costs cannot be definitively determined until all of the steps leading up to and through the writing of the project's Financial Offering have been successfully accomplished.
 - Full project financing is by far the largest sum the team will have to raise.
 - It will not be invested into the project until all of the investors and or financial institutions are convinced that the project team has carefully planned and fully contracted every aspect of the project and that the needed expertise to carry out the plan has been assembled.

II. THE FOUR STAGES OF THE PROJECT DEVELOPMENT CYCLE



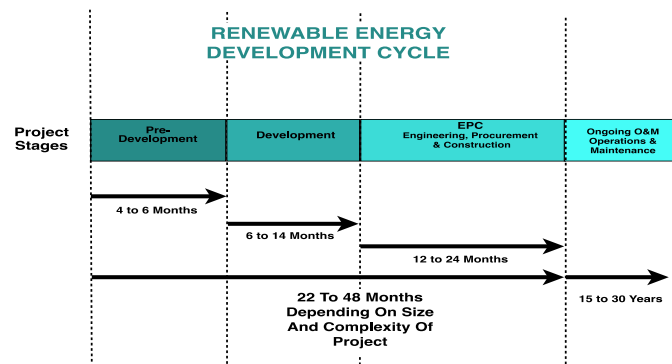
II. THE FOUR STAGES OF THE PROJECT DEVELOPMENT CYCLE

- Most of the project team's work is accomplished in the first two stages of **Pre-Development** and **Development** when the team will be operating substantially on its own.
- As a project evolves through the second **Development** stage, more and more outside experts and assistance will be required. However the team is always the driving force behind the project.



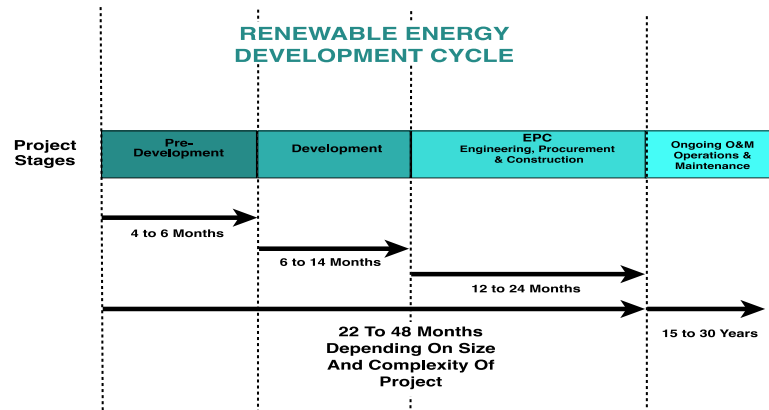
II. THE FOUR STAGES OF THE PROJECT DEVELOPMENT CYCLE

- Project team oversight is required during the third **EPC** stage.. EPC work is complex and so is usually contracted out to a specialized EPC engineering firm.
- The team must decide if it intends to operate and maintain the facility itself or whether it wants to contract with a specialized **O&M** engineering company to run the facility once it is built and officially commissioned for continued use.
- Some engineering firms do both EPC and O&M work.



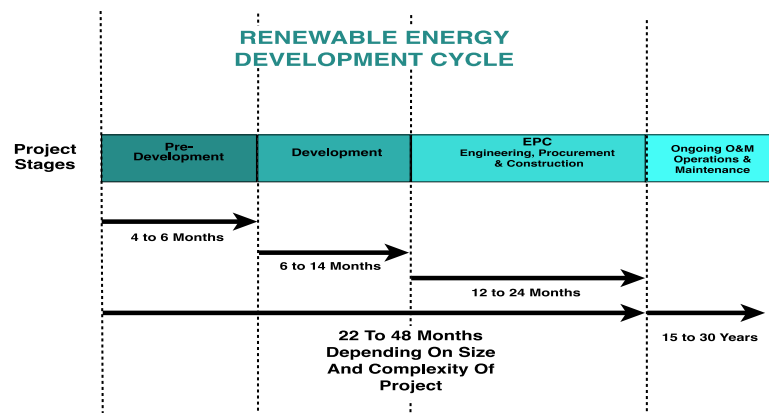
II. THE FOUR STAGES OF THE PROJECT DEVELOPMENT CYCLE

- Any of the four stages could be accomplished in less time. However, experienced renewable energy project developers will almost always advise new project teams to plan on each stage taking significantly longer to accomplish than they originally expect.



II. THE FOUR STAGES OF THE PROJECT DEVELOPMENT CYCLE

- Any of the four stages could be accomplished in less time. However, experienced renewable energy project developers will almost always advise new project teams to plan on each stage taking significantly longer to accomplish than they originally expect.



III. THE THREE PROJECT DEVELOPMENT MASTER DOCUMENTS

The three critical and essential master documents of every renewable energy project are a **Feasibility Study**, a **Business Plan** and a **Financial Offering**. They:

- Are complex, lengthy, have specific formats
- Must be carefully prepared to comply with all legal requirements
- Must follow all of the rules, regulations and legal requirements of the city, county, state and nation where the plant will be located
- Are not the only legal documents that will be necessary to prepare for a renewable energy project.
- Are used to raise capital to move the project to the next stage of development and should therefore be considered important sales tools for the project

III. THE THREE PROJECT DEVELOPMENT MASTER DOCUMENTS

Feasibility Study: Is an initial summation of the proposed project addressing all of the six **Essential Project Elements** and is:

- Usually written by the project team midway in **the Pre-Development Stage**
- Written after the team has done a fairly comprehensive survey of the project's **Six Essential Elements**
- Used to evaluate the project to determine if the concept is feasible and practical to pursue further
- Used to raise the development capital needed to move the project through the **Development Stage**
- Usually paid for out of the pockets of the project team or with capital raised from friends and or family members

III. THE THREE PROJECT DEVELOPMENT MASTER DOCUMENTS

Business Plan: Is an official document used to raise capital to further develop the project and:

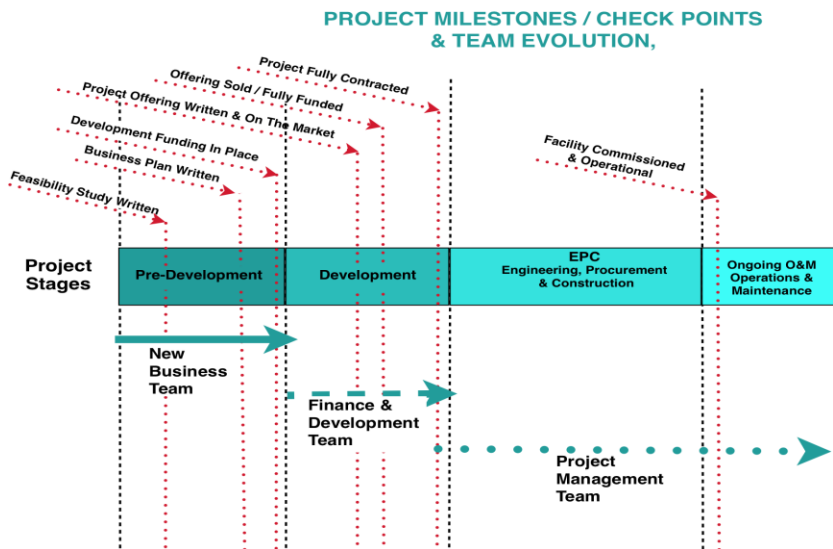
- Is often prepared by or with the assistance of a professional business plan writer or an attorney
- Must accurately represent all the aspects of the project
- Cannot exaggerate any detail of the project
- Must carefully outline all the risks associated with the project
- Must comply with all federal legal requirements and those of the state where it is written
- Must cover in detail all six essential elements of the project
- Once completed the business plan is then “put on the market” with the intent to attract “early-in” project development investors

III. THE THREE PROJECT DEVELOPMENT MASTER DOCUMENTS

Financial Offering: Is a group of official documents prepared specifically for “qualified” investors who can prove that they have the financial means to risk the investments being sought. It:

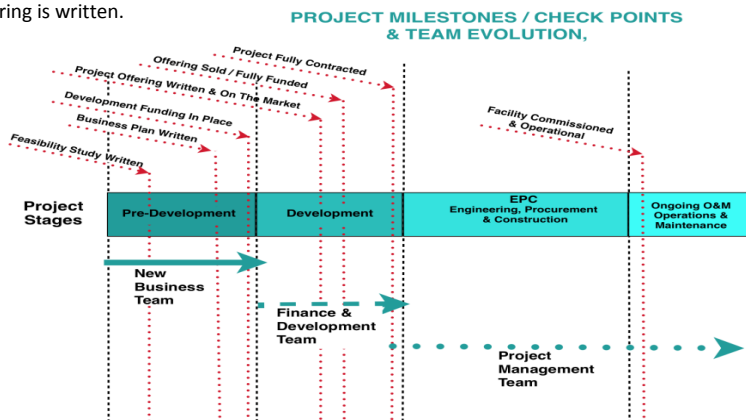
- Is written midway in the **Development Stage**
- Is used to attract the largest sum of money raised by the development team
- Is used to raise capital needed to design, procure the equipment and real estate needed by the project, construct the project facility from the ground up, get the new facility tested and commissioned for continuous use, and operate the facility until it begins to make money.
- Requires the oversight of competent legal council and is almost always written by an attorney
- Must be in full compliance with all Security and Exchange Commission and IRS regulations and those governing financial offerings of the state where the project will be located.
- Has many possible forms depending on the type of legal structure required by and the type of financial instruments required for the specific project in question
- Is expensive to produce and can cost from several thousands of dollars to several tens of thousands of dollars

III. THE THREE PROJECT DEVELOPMENT MASTER DOCUMENTS

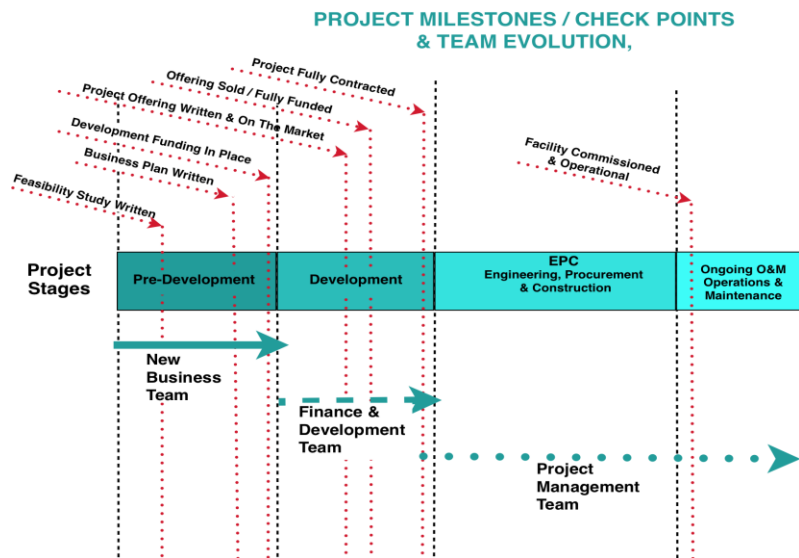


III. THE THREE PROJECT DEVELOPMENT MASTER DOCUMENTS

The three master documents can also be seen as milestones or “Go / No-Go” waypoints in the project development process. Before each successive stage of project development is reached, a decision to proceed or stop must be made. For instance, somewhere in mid Pre -Development Stage when a project is largely conceptual, the project team has to decide to take the project to the next level of commitment and produce a robust feasibility study or let it all go. The same question should be asked before the Business Plan is written and again before the Financial Offering is written.



IV. PROJECT TEAM EVOLUTION



IV. PROJECT TEAM EVOLUTION

As can be seen in the graphic above the project team must be able to evolve during the four stages of the project development cycle.

New Business Team

➤ During the **Pre-Development Stage** the project team is in essence a **New Business Team**.

➤ The project team literally dreams up an idea for a business with lots of brainstorming and research. Ideas fly back and forth and a concept of a possible business is imagined and then checked against the reality on the ground. The idea is re-imagined and researched again; often many times.

➤ This continues until a fairly clean concept of what may be possible is achieved and the team decides to write a feasibility study. The study is largely used to assure team members and potential early round investors that the project stands a reasonable chance of succeeding.

➤ Then the team writes a formal business plan used to attract development funding investor capital.

➤ Using the business plan as a sales tool and the concept has been “sold” to project development investors, the team morphs into what can be called a **Finance & Development Team**.

IV. PROJECT TEAM EVOLUTION

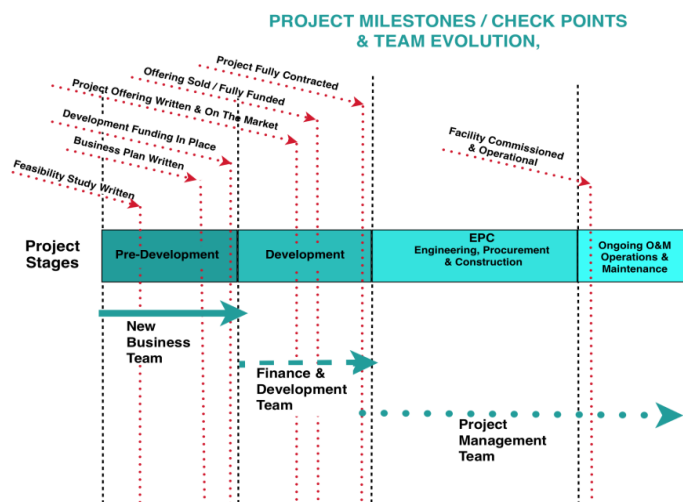
Finance and Development Team

- After development capital has been raised the team enters the **Development Stage** and it in essence becomes a **Finance and Development Team**.
- The team then begins to research write and negotiate the deal points and details of the specific feedstock and offtake agreements, technology purchases, site agreements, team employment and management plans, marketing plans, EPC arrangements, O&M arrangements, in short, everything needed to build and start the business.
- This work culminates in formal project offering documents, The set of formal documents called the “Project Offering” is written according to specific SEC and IRS rules and regulations. The project puts the offering “on the market” to qualified investors as a business “opportunity.”
- Once the project offering has been “sold” to project investors, the team morphs again into what can be called a **Project Management Team**.

IV. PROJECT TEAM EVOLUTION

Project Management Team

The project team’s primary work at this point is to oversee the spending of project development funding to get the planned facility actually built and operating.



Evaluation & Certification

- Trainee in-workshop discussion participation.
- Trainee's successful completion and presentation of their "Back of the Napkin" Feasibility Study.

PowerPoint Presentation Slides:

"Back of the Napkin" Feasibility Study

WORKSHOP ACTIVITY

IV. PROJECT TEAM EVOLUTION

As can be seen in the graphic above the project team must be able to evolve during the four stages of the project development cycle.

New Business Team

➤ During the **Pre-Development Stage** the project team is in essence a **New Business Team**.

➤ *The project team literally dreams up an idea for a business with lots of brainstorming and research. Ideas fly back and forth and a concept of a possible business is imagined and then checked against the reality on the ground. The idea is re-imagined and researched again; often many times.*

➤ This continues until a fairly clean concept of what may be possible is achieved and the team decides to write a feasibility study. The study is largely used to assure team members and potential early round investors that the project stands a reasonable chance of succeeding.

➤ Then the team writes a formal business plan used to attract development funding investor capital.

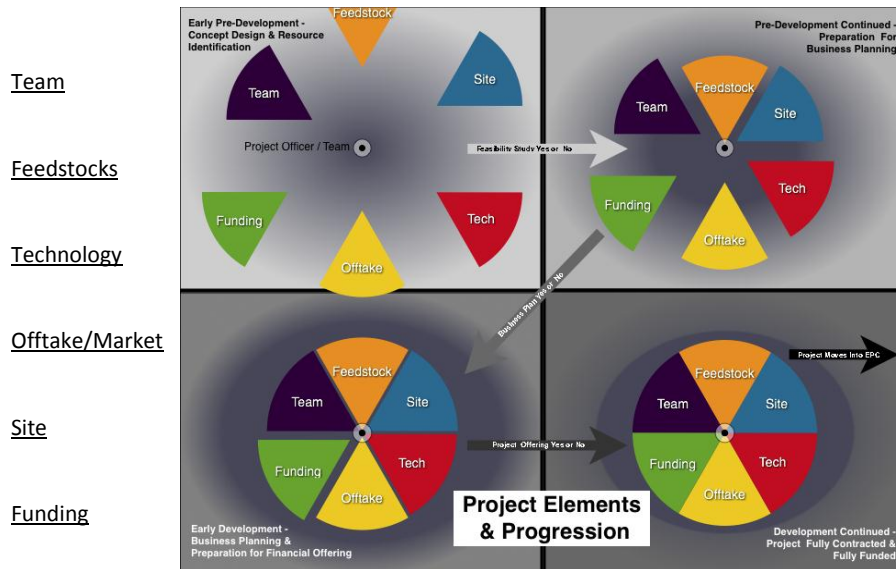
➤ Using the business plan as a sales tool and the concept has been “sold” to project development investors, the team morphs into what can be called a **Finance & Development Team**.

III. THE THREE PROJECT DEVELOPMENT MASTER DOCUMENTS

Feasibility Study: Is an initial summation of the proposed project addressing all of the six **Essential Project Elements** and is:

- Usually written by the project team midway in the **Pre-Development Stage**
- *Written after the team has done a fairly comprehensive survey of the project's **Six Essential Elements***
- Used to evaluate the project to determine if the concept is feasible and practical to pursue further
- Used to raise the development capital needed to move the project through the **Development Stage**
- Usually paid for out of the pockets of the project team or with capital raised from friends and or family members

I. THE SIX ESSENTIAL PROJECT ELEMENTS



Workshop Activity

- Either alone or with another class member with whom you could explore what it would feel like to walk into business development...
 - Discuss your business idea(s)
 - Which of the six elements do you think could actually be “in place”?
 - Please refer to [BUSINESS DEVELOPMENT ANALYSIS MODEL Handout For Feedstock And Market / Offtake Ideas](#).
 - Which of the six elements appear likely?
 - Which of the six elements might be a no go?
 - If no go, can you adjust your strategy for higher likelihood of a “go”?
 - Write or map out your idea that contains your six elements for the technology you just learned.

Workshop Discussion

- Present and discuss each idea.
- Any points of clarification?
- Any “no go” insights?
- Any suggestions for making each project more feasible?

This workforce solution was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership. This solution is copyrighted by the institution that created it. Internal use by an organization and/or personal use by an individual for non-commercial purposes is permissible. All other uses require the prior authorization of the copyright owner.