Evaluating, Selecting & Financing Energy Projects

RED
RecycledEnergy Development

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Setting Context

Who is RED?

- Recycled Energy Development ("RED"):
  - Our Mission is to profitably reduce greenhouse gas emissions
  - We design, build, own, operate & finance energy project with our Industrial Hosts
- We focus on "profitability":
  - Profitable for our industrial hosts
  - Profitable for our investors
  - Reduce carbon for the benefit of Society
- Benefits to Industrial Host:
  - Stronger balance sheets,
  - Lower Operating Expenses,
  - Greater competitive position,
  - Reduced carbon footprint

Industrial Perspective

- These issues and questions contribute to your "Wall-of-Worry":
  - Boiler MACT has caused a lot of consternation because of the uncertainty and potential high costs to comply
  - It is unclear HOW and WHEN EPA/MACT requirements will be enforced
  - It is currently a challenging market for the products you manufacture and sell
  - This is exacerbated under a scenario where the economy slows or if we face greater price pressure from foreign competition?
  - Your CEO is laser focused on your core business and life cycle of your product line(s)
  - Non-core business units (like energy) get starved for capital and high hurdle rates for investment
  - Is this the end of coal and solid fuels?
  - Your business lives or dies on the profitability of your products

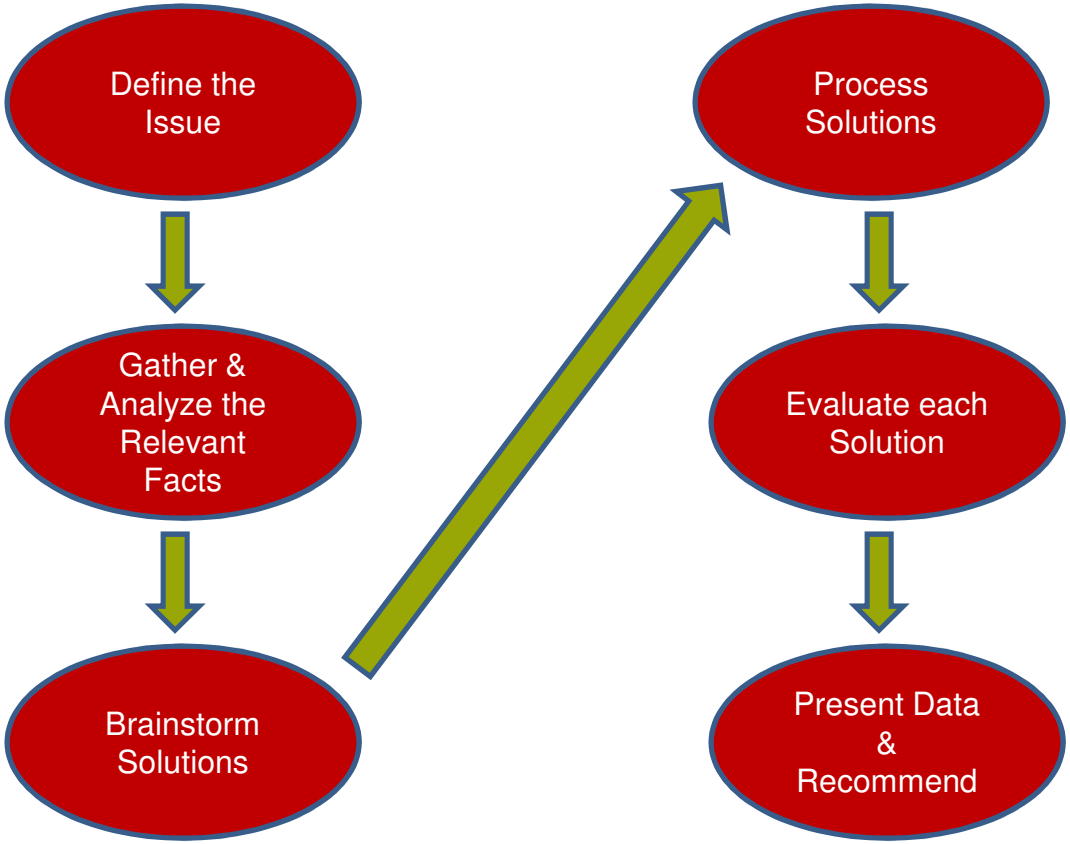
CEO's Questions

- Your CEO's or Executive team may pose the following questions:
  - What are our compliance options?
  - What is OUR COST to comply with MACT?
  - What return will we get on this investment?
  - When will we have to make the investment?
  - How will we finance this investment?
  - Will this legislation double or triple our cost of energy?
  - What does this do to our per-unit cost of production?
  - Are our competitors in the same position?
  - Can our business survive?

Tough Issues Require Creative Solutions

Strategy to Address

- Implement process for creative problem solving:



- Use a process like this to: (a) prepare answers for your CEO, and (b) present a defensible case to seek funding for your MACT compliance needs

Defining the Issue & Fact Gathering

Step 1

Define the Issue:

- What are our top 3 actions to respond to the EPA/MACT regulations?

Suggestions:

- Consider the questions your CEO may pose
- Ask her directly
- Seek input! More input from the various stakeholders the sharper your understanding of the problem *& Constraints*!

Step 2

Gather & Analyze the *Relevant* Facts:

Sample Questions (to answer):

- When do we need to make a decision?
- What is currently known/unknown?
- Will the unknowns be known at some point?
- If so, when? Can I wait for that information?
- Is there a party or organization driving this issue?
- Can my Company influence their decisions?
- What is important to our leadership's decision-process on this issue?
- Who is affected by the issue?
- What is the Market telling us?
- What do vendors/suppliers/competitors say about the issue?
- What are the specific ways our company is impacted?
- What is the specific impact on our product line(s)?
- What are the key metrics OUR company will use to evaluate this issue?

Brainstorming Solutions & Processing

Step 3

Brainstorm Solutions:

- Back-end Controls
- "Do-Nothing" (close plant on compliance date)
- Move production facility off-shore
- Outsource production
- Try to influence outcome/final ruling
- Install CHP

Recommendation:

- The concept is to be as creative & open minded as possible
- Don't rule anything out at this stage, save that for Step 4

Step 4

Process & Analyze Each Solution:

- First, identify simple & defensible ways to narrow the list of potential solutions to a manageable number
- Do a complete and thorough analysis of each option

Evaluating, Presenting & Recommending

Step 5

Evaluate each Solution:

- Summarize your analysis of each option from Step 4
- Frame your evaluation so it will be understood by Leadership
- Focus on the key information that is critical to your Leadership

Recommendation:

- This stage can uncover gaps in your analysis, take the time to address them

Step 6

Present Data & Make Recommendation:

- Present your analysis
- Highlight the facts
- Be prepared to share and defend your recommendation

CHP Example

The Process

Step 1

Define the Issue:

- Identify our top 3 actions to comply with EPA/MACT regulations?

Step 2

Gather & Analyze the *Relevant* Facts:

Step 3

Brainstorm Solutions:

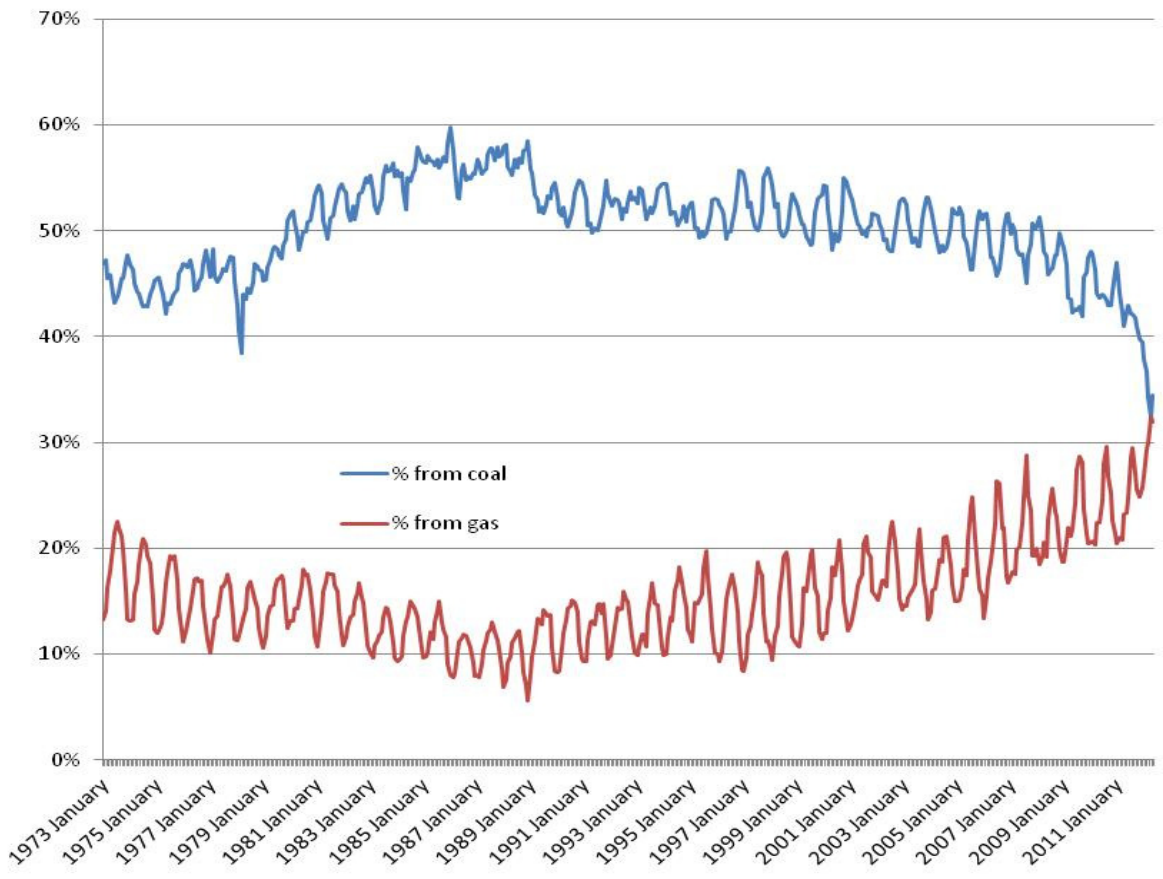
- Back-end Controls
- "Do-Nothing" (close plant on compliance date)
- Move Production Off-shore
- Outsource Energy Production
- Work with Industry Trade Groups to Lobby for Alternatives
- ***Install CHP***

Step 4

Process & Analyze Each Solution:

- Answer key questions that impact each solution

Step 4: Future Power Prices; Facts about US Generation



Generation data taken from the EIA Database

OBSERVATIONS:
Declining Coal Generation is not new, its been falling steadily since the late 1980s

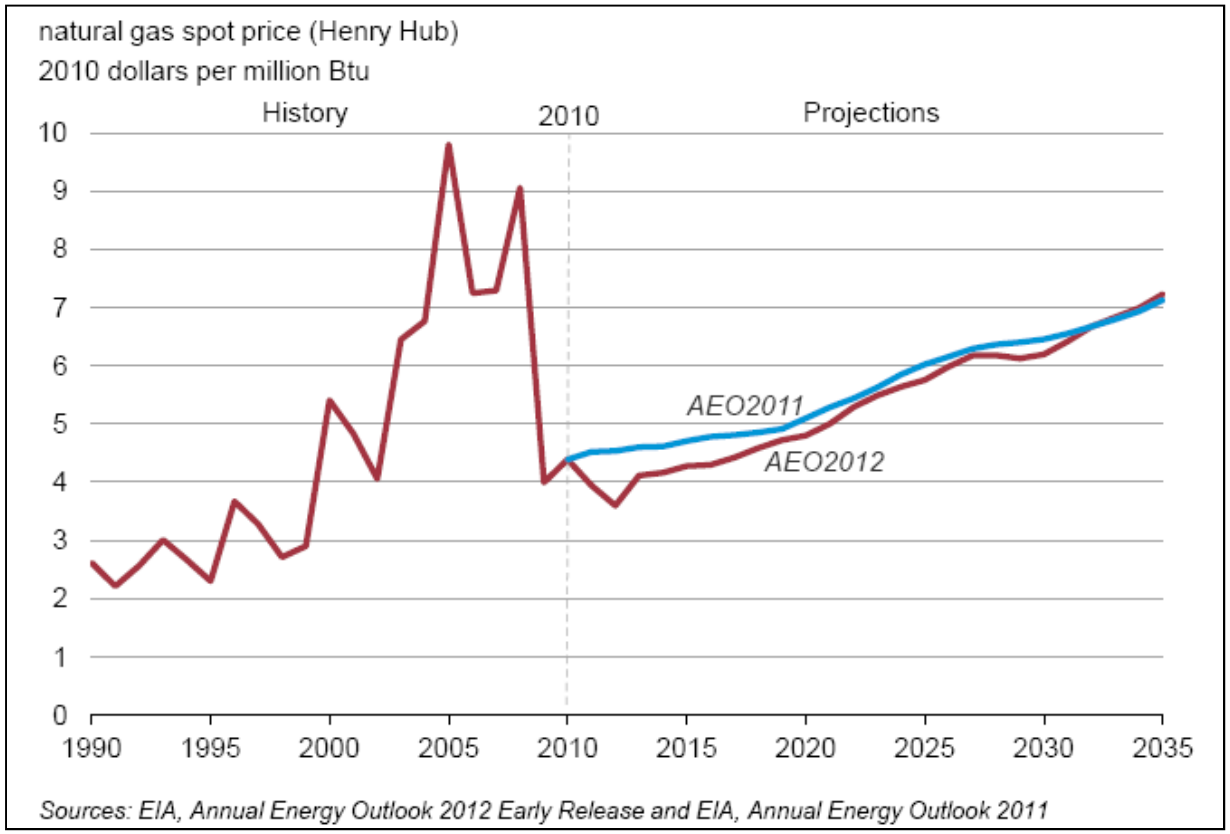
Minimal new coal built since Clean Air Act

Feeding recent collapse:
a. Falling gas prices
b. Maxing Utility Coal Fleet Reserve Margin

IMPACT:
1. electric grid becoming increasingly gas marginal
2. Future gas fired CHP likely much better hedged in Coal country
3. CHP can provide the lowest cost power to Utilities

Step 4: Our Natural Gas Price Forecast

- Based on our analysis of the volumes and cost of extracting shale gas, coupled with industry estimates, below:



- We estimate gas in the range of $6-$8/MMBtu over the next 15 years

Stage 4: State Remaining Assumptions

- Facts about Current Operations:
  1. Existing coal boilers produce 100,000 lbs/hr of steam
  2. Our steam load follows production, which is 24/7
  3. Age of boiler is 35 yrs old
  4. Boiler efficiency approx. 75%
  5. Currently burning low-sulfur 'compliance' coal
  6. Our long-term view of the price of compliance coal is $3.60/MMBtu

- Assumptions of CHP Installation:
  1. Replace coal boiler with standard GT, matched to thermal needs
  2. Typical gas turbine efficiency of 30% and approx. 75% of exhaust heat recoverable as steam
  3. We are using $6/MMBtu for Natural Gas
  4. Current US average retail power price is about $100/MWh, but we've assumed we sell the power for only $50/MWh
     a) Example: secured a Heat-Rate-based PPA with the Utility

Stage 4: Cost Analysis of CHP Option

- **Math:**
  - Current Operations:
    - Cost of delivered steam is ($3.60 MMBtu / 75% efficiency) = $4.80/MMBtu
    - Temporarily ignore the additional costs: maintenance, fuel handling and ash disposal
  - Gas fired CHP: for every 100 MMBtus of fuel burned, you produce:
    - 100 x 30% = 30 MMBtus of electricity, and;
    - 100 x (1 – 30%) x 75% = 53 MMBtus of steam
    - CHP plant achieves 83% efficiency, more than 2x the US power grid

$$\textbf{Fuel Cost} = \frac{\$6/\text{MMBtu}_{(\text{fuel})} \times 100/\text{MMBtu}_{(\text{fuel})}}{53/\text{MMBtu}_{(\text{steam})}} = \$11.32/\text{MMBtu}_{(\text{steam})}$$

$$\textbf{Electricity Credit} = \frac{-\$50/\text{MWh} \times \frac{1\ \text{MMBtu}}{3.413\ \text{MWh}} \times 30/\text{MMBtu}_{(\text{elec})}}{53/\text{MMBtu}_{(\text{steam})}} = -\$8.29/\text{MMBtu}_{(\text{steam})}$$

Net Cost of Steam ($11.32 - $8.29) = $3.03/MMBtu (steam)

- **Comparison:**
  - Current Ops= $4.80/MMBtu vs. CHP = $3.03/MMBtu
  - So in the name of pollution control, *we've reduced our steam costs by 37%*
  - *Additional Bonus*: (a) eliminates 100% of the sulfur, mercury and particulate emissions and reduces CO2 emissions (b) ignores the reduction in operating costs, (c) benefits of local power generation for your Utility (VAR support, etc)

*KEY: Benefits of Economic Gain

- Economic gain, simply defined is an amount of money that is saved or generated as a result of a certain action
  - Note the cost comparison did not include the cost of capital recovery
    - Fully Amortized Coal Plant vs. Newly Funded CHP Project
  - However, the CHP plant did show a cost savings, or economic gain
- It is significantly harder to finance a project that has an economic penalty than an economic gain
- To complete the analysis of economic gain need to include:
  - Mill Risk
  - Industry Risk
  - Product life-cycle
  - The security or back-stop behind the investment
  - Term of the investment
  - Source of funds
  - Strength of the PPA/Power off-take agreement

Stage 4: Risk & Mitgants

	Risk	Mitigant(s)
Execution Risks	Power Export stretches Corp comfort	• Work with Third Party Developer • Hire Experts or Consultants
Execution Risks	Challenges securing PPA	• Initiate constructive conversations with Utility • Hire Advisors
Execution Risks	Regulatory Risks	• Leverage existing coalitions to lobby Utilities & Government Agencies
Execution Risks	Permitting/NSR	• Join RED; resolve why Gov't classify back-end control as pollution control device, but a CHP plant that reduces more pollution triggers NSR?
Fuel Risks	Unexpected Fuel Price Increases	• Secure Heat Rate-based PPA with Utility • Implement gas hedging strategy

Step 5: Evaluating & Attracting Capital

- Speak the language of your audience!
  a) Assume your key decision makers (CEO, Chairman, CFO, etc) and your Banks/Lenders/Investors will not follow a conversation about MMBtus, Thermal Efficiency, etc.
  b) Use key financial metrics important to them, for example:
     i. Return on Investment (ROI)
     ii. Net Present Value (NPV) of investment over Product lifecycle
     iii. Simple Payback (# of years required to recoup your investment)
     iv. Savings/(Cost) on a per unit cost of production basis
     v. Unlevered (or Levered) Internal Rate of Return (IRR) on investment
     vi. Multiple of Investment (MOI) over product lifecycle
  c) Frame each option using the key financial metrics
- Know the constraints of your business

Step 6: Presenting the Data

		Option 1:	Option 2:	Option 3:	Option 4:
	Current Plant	Emissions Controls	Do Nothing	GT CHP No PPA	GT CHP w/ PPA
Boiler A	Coal	Replace	Retire	Retire	Retire
Boiler B	Coal	Coal	Retire	Retire	Retire
New Gas Boilers	No	Yes	No	Yes	Yes
Gas Turbine	-	No	No	Yes	Yes
CapEx	Base Case	$12M	n/a	$30M	$100M
Energy Cost (2017)	Base Case	+3%	n/a	-9%	-16%
***ROI**	**n/a**	**(negative)**	**n/a**	**+11%**	**+19%**

**Replace with key financial metrics for your business*

Overview of Process of Evaluating, Selecting & Financing an Energy Investments

Summary

- MACT is a challenging topic for a host of reasons
- Tough issues require creative solutions; be open to different alternatives
- Following a systematic and defensible process will increase your credibility with key decision makers
- Know the constraints of your business
- Evaluate the options once your analysis is complete
- Present each solution simply & clearly using language that resonates with your audience
- Highlight the key financial metrics associated with each solution
- The best way to attract capital is identify projects with the greatest economic gain for your business

Thank you