

DOE OFFICE OF INDIAN ENERGY

Energy Options Analysis

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U.S. DEPARTMENT OF
ENERGY

Office of
Indian Energy

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Options Analysis

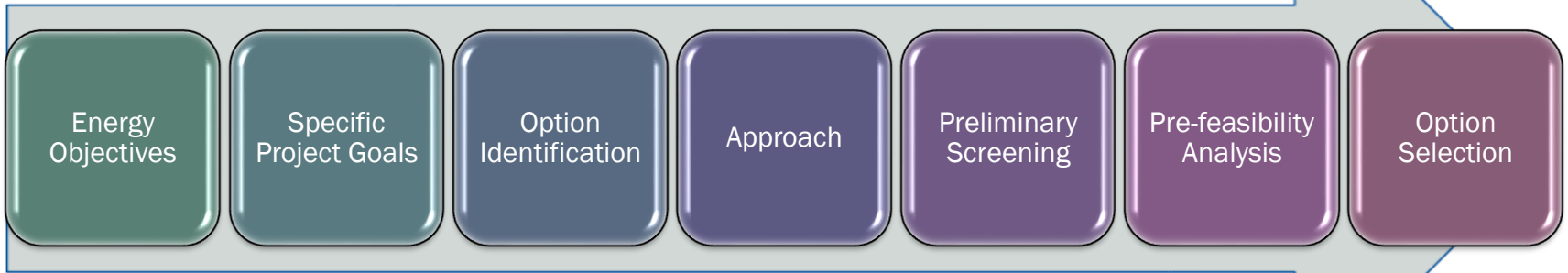


What is an Options Analysis?

The most recent DOE Office of Indian Energy Funding Opportunity Announcement (FOA) describes it as,

“a systematic assessment and evaluation of possible alternative approaches available for achieving specific energy objectives and determining which of the options are the most effective and provides the best solution to achieve those objectives. Such an analysis is intended to explore all feasible technology alternatives (e.g., conventional technologies, renewable technologies, energy efficiency measure(s)) and provide evidence that the proposed project choice can actually be implemented and is the best option available among all feasible alternatives.”

Options Analysis Methodology

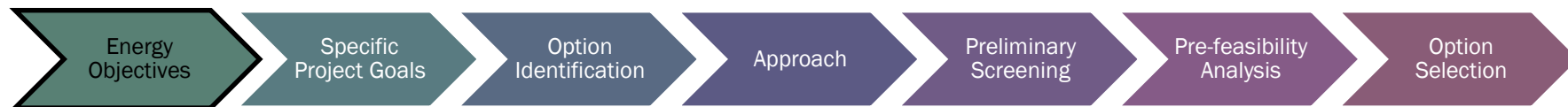


A concept not a specific process

- Energy Objectives
- Specific Project Goals
- Option Identification
- Approach
- Preliminary Screening
- Pre-Feasibility Analysis
- Option Selection

Note: the FOA Option Analysis template can be downloaded from the following webpage
<https://eere-exchange.energy.gov/Default.aspx#Foald19c6b408-a335-4b1e-bbcc-bb58d0c2ccdf>

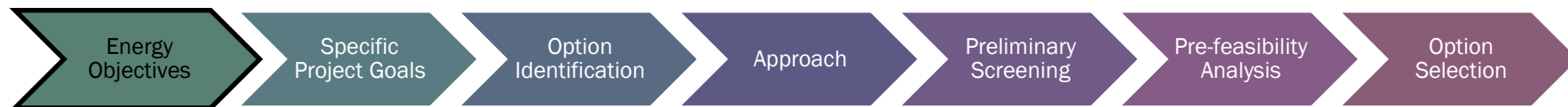
Energy Objectives



Examples of Primary Objectives:

- Support tribal environmental and **net-zero energy goals** by reducing reliance on non-renewable energy resources and increasing local renewable generation.
- **Minimize life-cycle costs** of energy services compared to historic costs.
- **Increase resiliency** by providing autonomous energy service for critical energy loads during utility outages.
- **Economic development** is a very high priority for the Tribe given the high poverty and unemployment rates on the reservation. The Tribe needs projects that can generate employment for the members as well as provide training and expertise for high demand jobs.
- **Align with the long-term vision** of the community: As the Tribe executes its strategic plan, the project must support this vision and enable progress towards it.

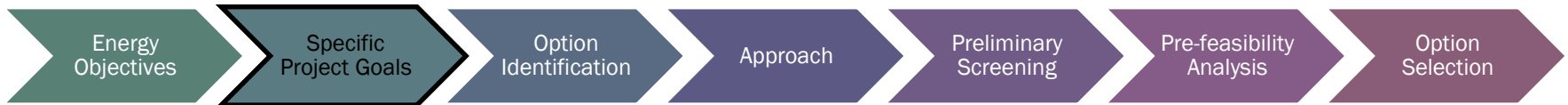
Energy Objectives (continued)



Examples of Secondary Objectives:

- Provide local **workforce development and education opportunities**.
- **Build internal capacity** for operations and maintenance.
- Provide **potential future expansions** to serve additional tribal buildings.

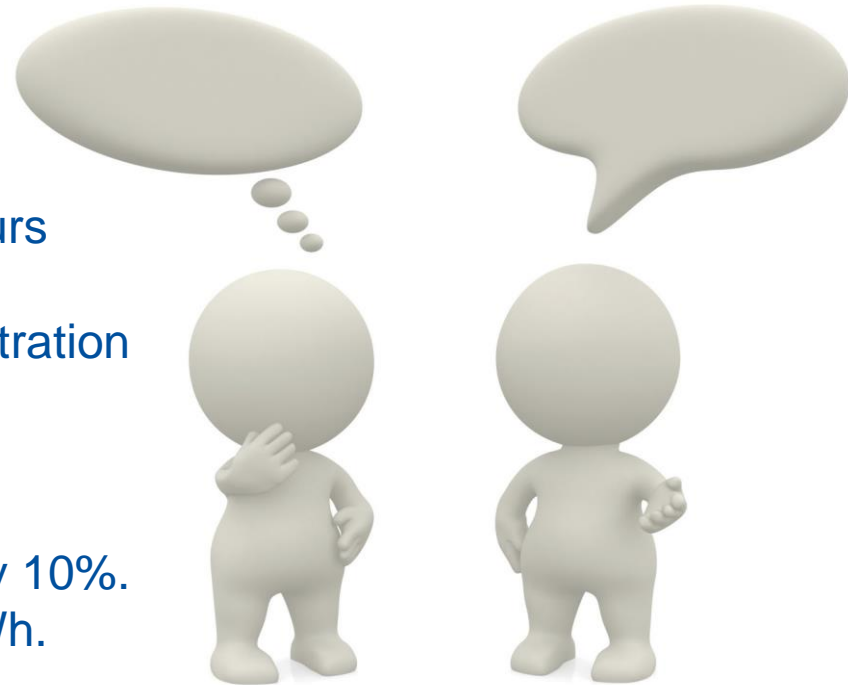
Specific Project Goals



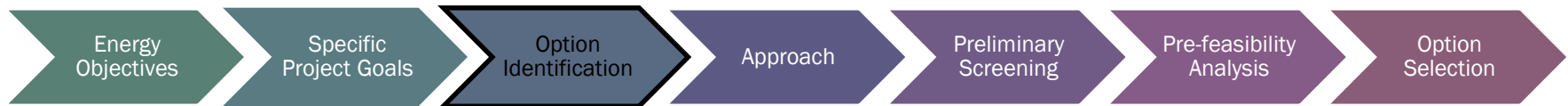
Project goals should define the intended end-result as a quantifiable metric.

Examples might include:

- On-site generation of 1 MW.
- Save 20% of annual energy costs.
- Provide power to critical facilities for 3 hours during an emergency situation.
- Provide peak power for the Tribal Administration building.
- Generate 100% of the power for all tribal community buildings.
- Increase renewable energy penetration by 10%.
- Reduce cost of electricity by \$0.03 per kWh.
- Reduce fuel consumption by 30%.



Option Identification



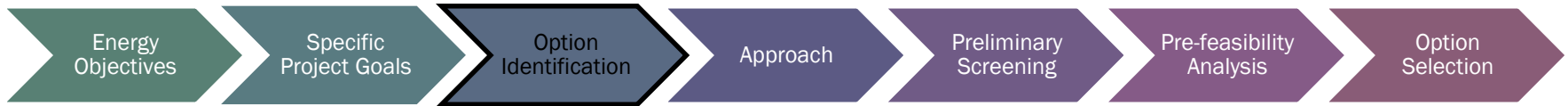
Options should include as a minimum, the baseline “current state” option, the “do-minimum” option(s), and a variety of “do-something” options.

“Current State” Option: The “current state” option (or “do-nothing” option) is evaluated as a bench-mark, to determine whether the other options considered improve or detract from the current situation.

“Do-minimum” Option(s): Define the “do-minimum” option(s) for the project which is a scenario that requires minimum effort and cost. This option assumes incurring certain insignificant investment outlays that go beyond the existing operational and maintenance costs. It is the least cost solution for achieving the overall objectives or requirements.



Option Identification (Continued)

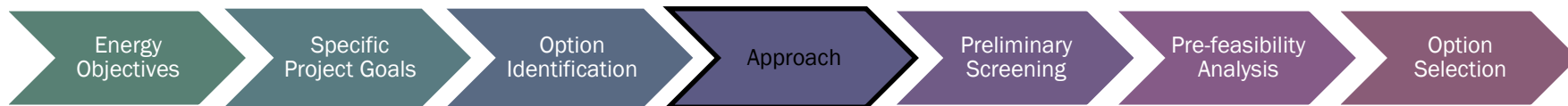


The “do-something” options should include all feasible technology options (e.g., conventional technologies, renewable technologies, energy efficiency measure(s)) to achieve the defined objectives and specific project goals.

"Do-something" Options. Identify other possible alternative solutions against the "do-nothing" and “do-minimum” options. Such solutions are identified on the basis of how they best meet the objectives or requirements. The "*do-something*" options typically involve an investment depending upon the energy objectives or requirements. In many cases, the focus is placed on cost, where every option is evaluated against the level of investment and amount of savings.



Approach



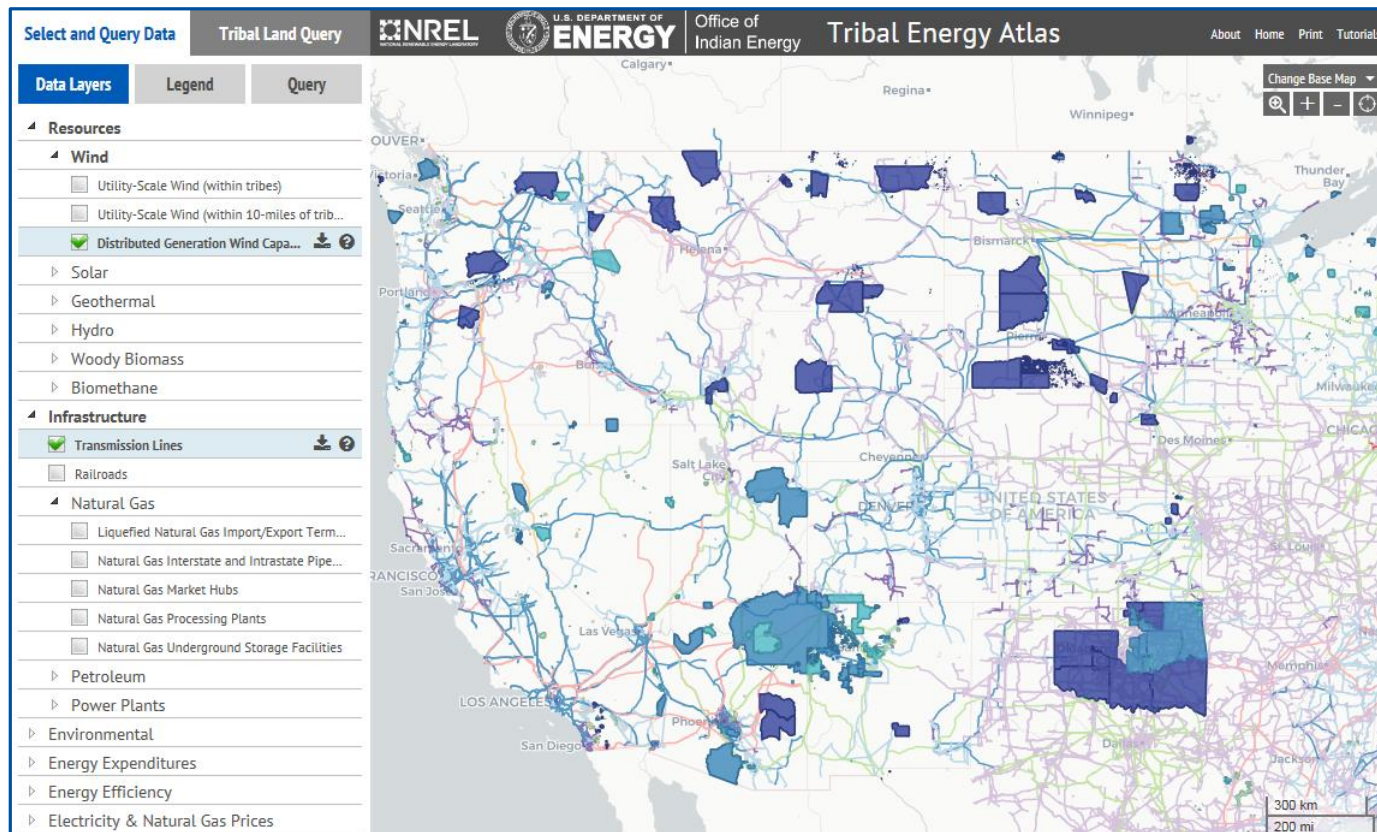
The approach to be used for the analysis. Specifically, how the analysis will be conducted.

An **example** might include: A three-step process of information gathering and analysis:

- 1) **Preliminary Screening:** Considered options and ruled out non-viable technologies, designs, and project approaches.
- 2) **Vendor Proposals and Inputs:** Identified several qualified vendors and solicited informal project proposals and advice. [The use of vendor proposals provides resource and technology information for comparison. The [Tribal Energy Atlas](#) may provide some basic information in order to evaluation various energy options.]
- 3) **Design Modeling and Feasibility Analysis:** Analyzed feasibility of proposed systems, performed iterative modeling, and produced recommendations. [The use of models and tools to optimize the selected option and/or to verify *information*.]

Tribal Energy Atlas

First-of-its-kind interactive geospatial application that enables tribes to conduct their own analyses of installed energy projects and resource potential on tribal lands.

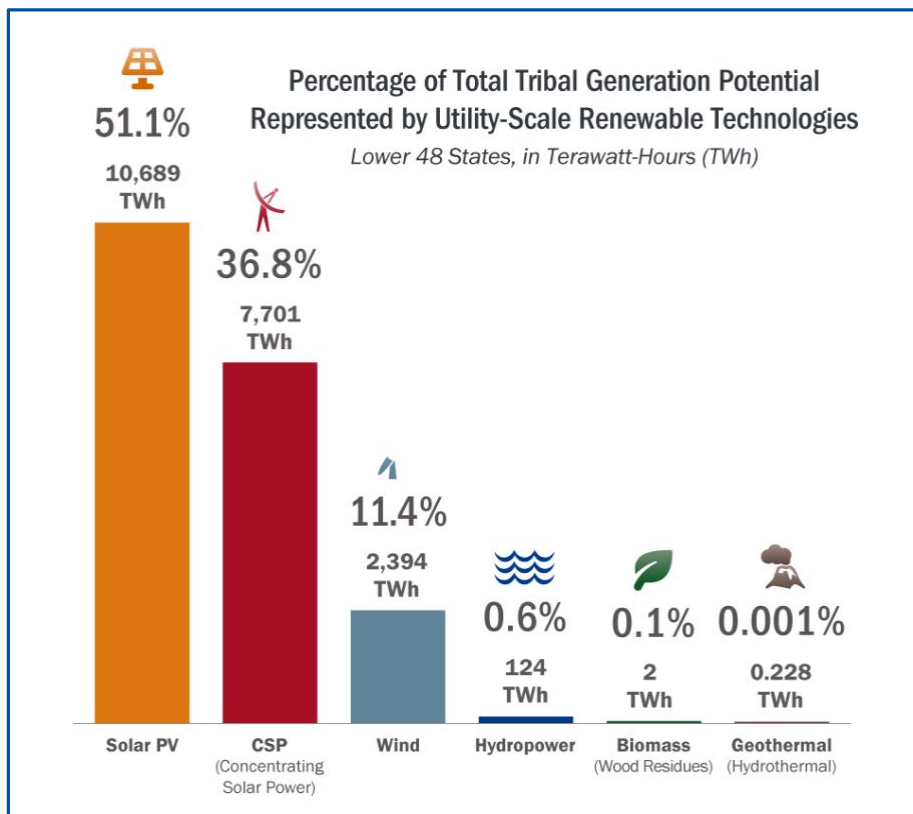


To access, see the Indian Energy website at www.energy.gov/indianenergy

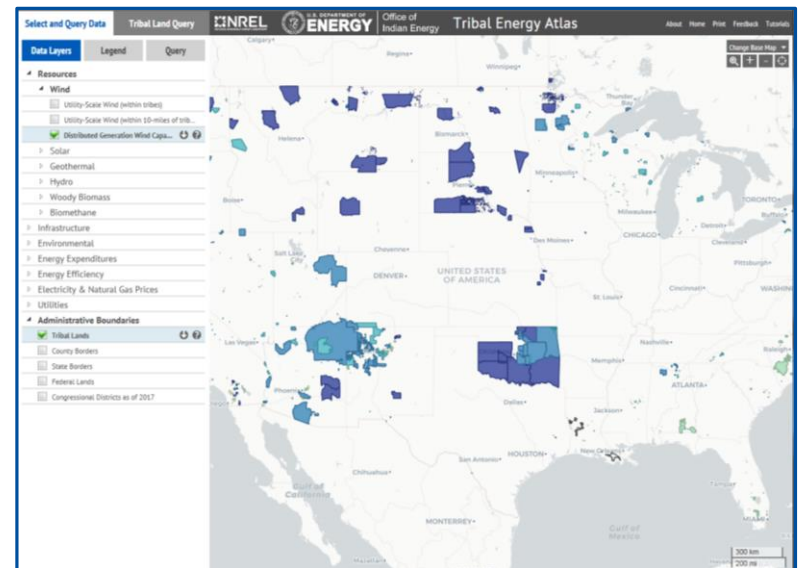
Techno-Economic Potential

Key results from this techno-economic potential analysis include:

- While tribal lands make up approximately **5.8%** of the land area in the conterminous United States, the estimated **utility-scale renewable energy technical potential** on these lands is **6.5% of the total national potential**.



New Interactive Tool Puts Tribal Energy Resource Data in Tribes' Hands

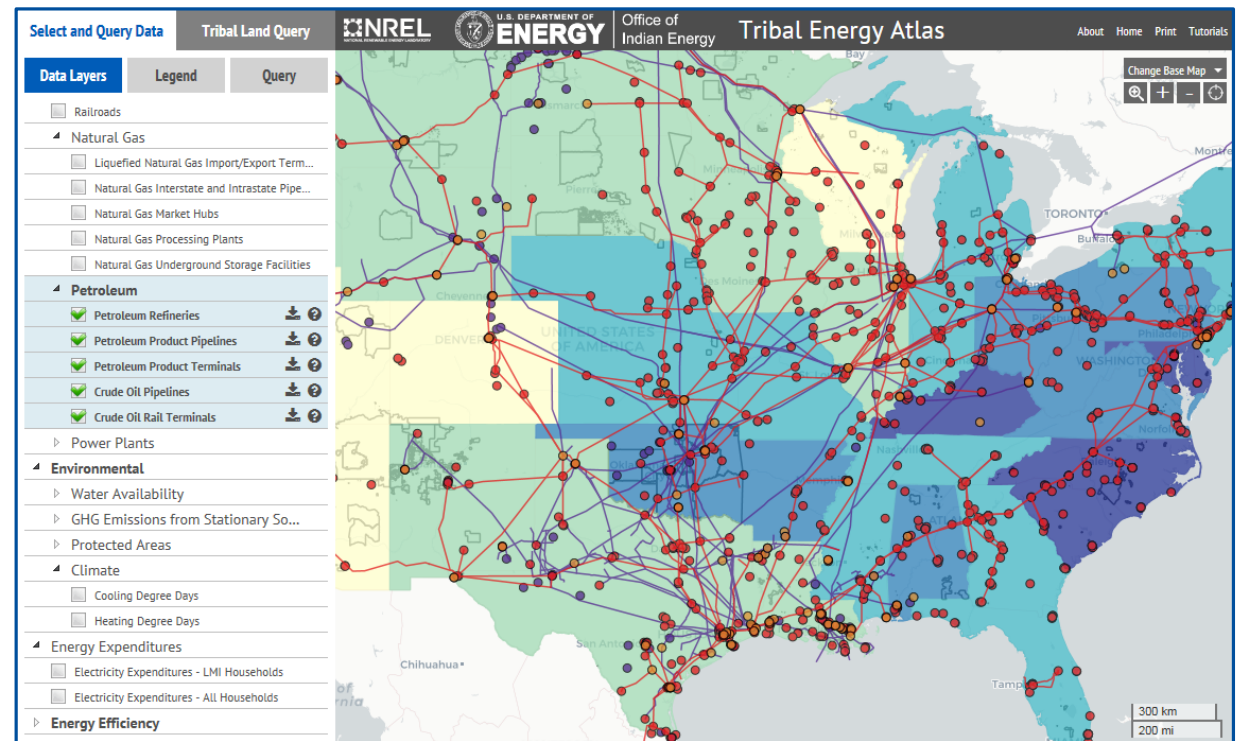


Tribal Energy Atlas

Includes the most current technical and economic tribal energy potential estimates

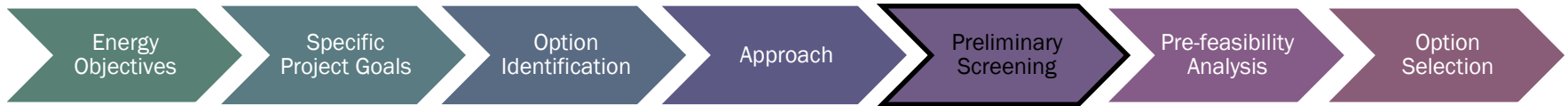
Includes:

- Energy resource data
- Infrastructure information
- Environmental information
- Energy efficiency savings
- Electricity and natural gas prices



To access, see the Indian Energy website at www.energy.gov/indianenergy

Preliminary Screening



An initial screening of various options before investing in a more detailed analysis. The preliminary screening will evaluate options against specific criteria.

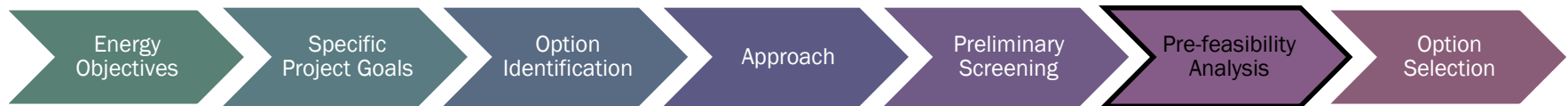
Possible preliminary screening methods may:

- Screen the options against the primary and secondary objectives,
- Use a SWOT (strengths, weaknesses, opportunities and threats) analysis,
- Fatal flaws analysis, or
- Identify the pros and cons of each option.



Note: The Template includes detailed examples

Pre-Feasibility Analysis



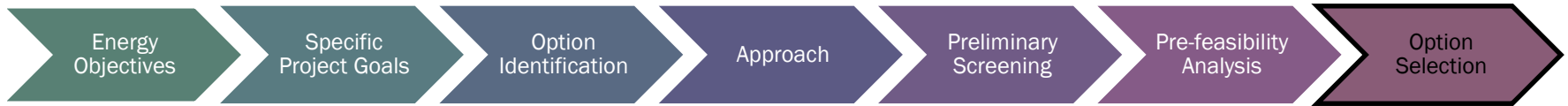
The pre-feasibility analysis is a more thorough investigation of the options that passed the preliminary screening it might include the following:

- **Carry out demand analysis.** Such an analysis means you must evaluate the need for a project investment through assessing 1) current demand and 2) forecast future demand. Demand analysis aims to formulate a hypothesis about the project's capacity and size which are defined by either current demand or forecast demand. For each of the identified options you need to conduct demand analysis and find out which options ensure the most suitable project capacity and size in terms of current/future demand.

Pre-Feasibility Analysis (Continued)

- **Evaluate energy resources.** Evaluate the availability of energy resources (e.g., conventional and renewable). Technical potential data for conventional fuels are typically proprietary; however, Tribes may be able to access federal assistance to analyze their fossil fuel potential.
 - Contact the Department of Interior’s **Division of Energy and Mineral Development** for additional information: <https://www.bia.gov/as-ia/ieed/division-energy-and-mineral-development>.
 - Renewable energy resource potential information is freely available to tribes through the **U.S. Department of Energy Office of Indian Energy-funded Tribal Energy Atlas**: <https://maps.nrel.gov/tribal-energy-atlas/>. The Atlas also contains information on the location of power lines, gas lines, utility rates, and average household expenditures on energy sources.
- **Explore technology alternatives.** Explore all feasible technology alternatives (e.g., conventional technologies, renewable technologies, energy efficiency measure(s)).
- **Other considerations.** Consider other factors such as fuel costs, fuel supply, interconnection, logistics, operation and maintenance, and training.

Option Selection



Compare project options and make the final selection.

Example methods to compare project options:

- **Perform multi-criteria analysis.** Another way to select the best project option is to compare all the options by using various criteria. This kind of analysis lets you deal with a suite of different objectives that cannot be aggregated into a single benefit. Specifically, a multi-criteria analysis is when a project is evaluated by more than just monetary terms. It is a form of appraisal that, in addition to monetary impacts, measures variable such as material costs, time savings and project sustainability as well as the social and environmental impacts that may be quantified but not so easily valued.
- **Perform cost-effectiveness analysis.** This step is where project options are compared relative to cost and outcomes. Specifically, a cost-effectiveness analysis is a form of economic analysis that compares the relative costs and outcomes (effects) of different courses of action. Cost-effectiveness analysis is distinct from cost–benefit analysis, which assigns a monetary value to the measure of effect. The goal is to select an option that best meets the objectives.

Option Selection

Compare project options and make the final selection.

Example methods to compare project options:

- **Evaluate economic impact.** Another method that could be used to select the best project option is the use of an economic impact analysis. This evaluation could use the levelized cost of energy (LCOE), Rate of Return (ROI), Net Present Value (NPV), or even simple payback.
- **Make the final decision.** At this last step all the steps taken are summarized and it is confirmed whether the analysis has demonstrated that alternative feasible options have been adequately examined and considered and that the best option has been selected.



Questions?

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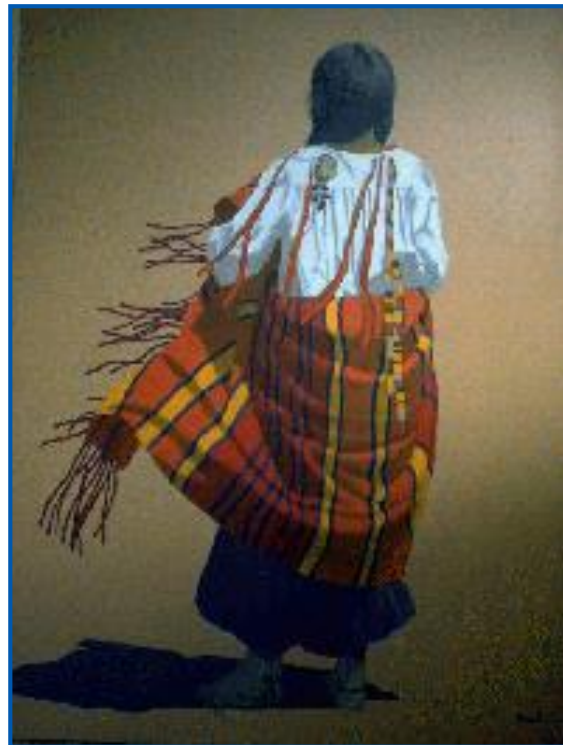
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