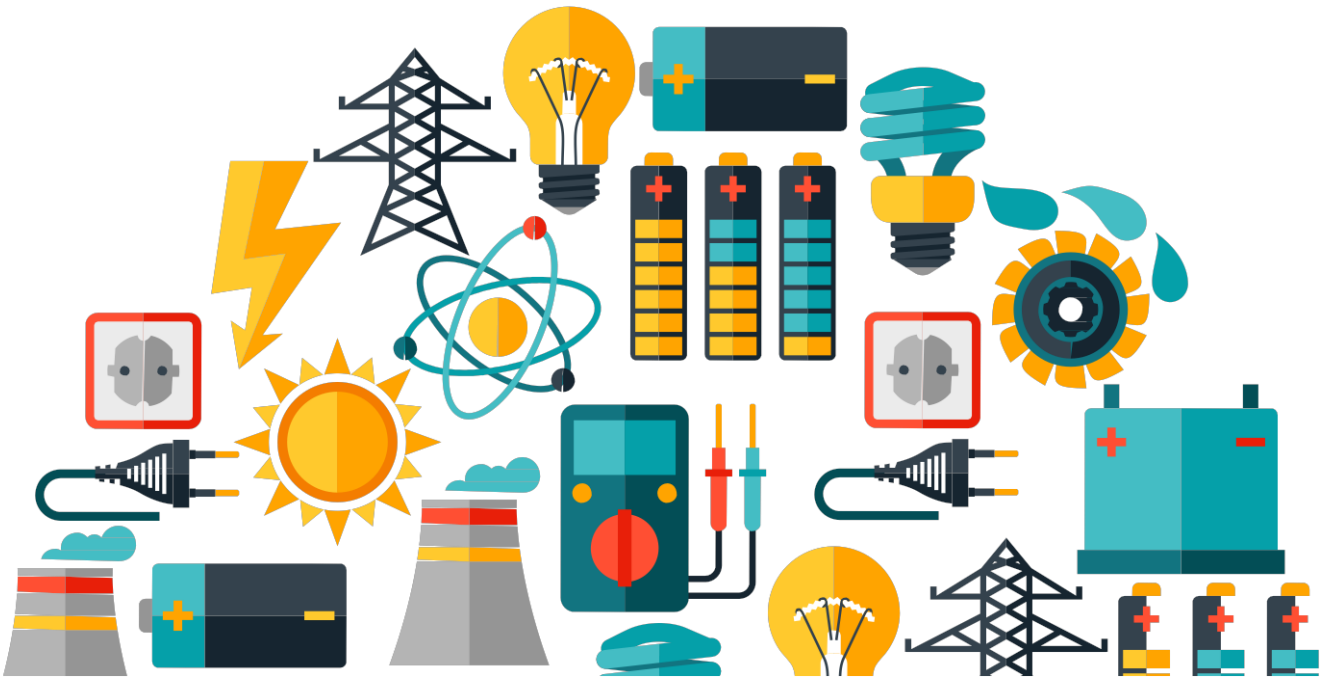
POWER ANALYTICS™

Energy Alignment Plan™

Optimal Microgrid Solutions begin with a
Strategic Energy Alignment Plan



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Microgrid Basics:
Optimal Microgrid Solutions begin with a Strategic *Energy Alignment Plan*

Step 1: The Energy Alignment Plan Leads to the Energy Master Plan

Power Analytics™ Corporation begins every microgrid project by developing a strategic ***Energy Alignment Plan***. An Energy Alignment Plan aligns a client's microgrid goals and objectives with optional power solutions. This high-level plan considers all aspects of the project, including:

- Microgrid location alternatives;
- Existing generation and distribution assets;
- Traditional generation resources such as natural gas-fired generation and combined heat and power; as well as renewable alternatives such as wind, solar, and small hydro;
- Advanced storage technologies;
- Demand response and energy efficiency options;
- Existing and needed communications infrastructure;
- Estimated project cost and timing;
- Local utility interconnection requirements; and,
- The regional energy marketplace.

After client concurrence on the Energy Alignment Plan, an in-depth ***Energy Master Plan*** is produced. The Energy Master Plan includes the development of a power model for the target location. As the project moves forward, this power model will become the foundational base-case scenario for testing optional power equipment configurations; and, once the microgrid is built, it will be used to manage the microgrid in real time and for future system planning and expansion. The Energy Master Plan also includes a deep analysis of renewable generation options and advanced battery storage for demand response, peak demand shaving and/or shifting, energy cost savings and reduction of

greenhouse gas emissions. Finally, the Energy Master Plan includes an analysis of existing and recommended controllable equipment and devices and an outline of the required coordination with all other stakeholders involved in the project.

Step 2: Scenario Analysis Leading to an Optimal Power Solution

The base-case power model is then used to evaluate the impact of various operational scenarios for the microgrid using different equipment configurations. This scenario analysis generally considers:

- Photovoltaic (PV) solar energy integration, solar forecasting and optimization;
- Advanced energy storage optimization;
- Hydro opportunities for generation and/or energy storage, if appropriate;
- Local community critical infrastructure needs, and possible industrial, commercial, and residential consumer participation in the overall plan;
- Use of existing generation assets; and,
- Local utility generation, transmission, and distribution assets—existing and planned.

As each scenario is run, the following factors are considered:

- High integration of renewables at acceptable cost;
- Operability, reliability, and full life-cycle issues;
- Sustainability and resilience;
- Environmental issues and footprint;

- Energy indexes;
- Growth capacity;
- Repeatability of the concept;
- Standardization of the components;
- Individual environmental advantages,
- Capital and operational costs; and,
- Communications networking and infrastructure, SCADA, integrated software architecture and control room integration.

Step 3: Power System Studies

For each scenario, Power Analytics also produces a power system study. These studies help us to investigate the technical side of the design from a power engineering perspective and to facilitate the client's decision-making process by ranking the scenario results to facilitate the final selection of the optimal microgrid configuration. These studies comply with the latest ANSI/IEEE standards and the national Electric Code (NEC), and draw from the models and simulations that were performed during the Energy Master Plan phase. These studies are provided to the client, and include:

- Power system modeling and database updates for each scenario;
- Load flow studies to determine system power flow characteristics;
- Short circuit studies under normal and maximum fault conditions;
- Equipment rating studies and recommendations;
- Protective device coordination studies, recommendations, and configuration files;
- Recommendations for PV plant and battery storage bank interconnection;

- Transient Stability Analysis, including dynamic modeling of generators and controllers;
- Contingency screening and voltage stability analysis.

Step 4: Summary and Detailed Reports

Power Analytics summarizes the energy analysis and power generation scenarios for the client, and provides recommendations and an integration plan. The client receives the initial Energy Alignment Plan, and its related reports; the comprehensive Energy Master Plan, the power model, the scenario analysis, and all related reports. Upon client request, Power Analytics will also participate in any equipment specification and selection reviews. This may include a review of all software, networking, and overall architecture of all major subsystems associated with the project. A key focus area would be the metering, monitoring, control, communications and interaction of the system to ensure the highest level of performance and data integration.

Step-by-Step, Stage-Gate Approach

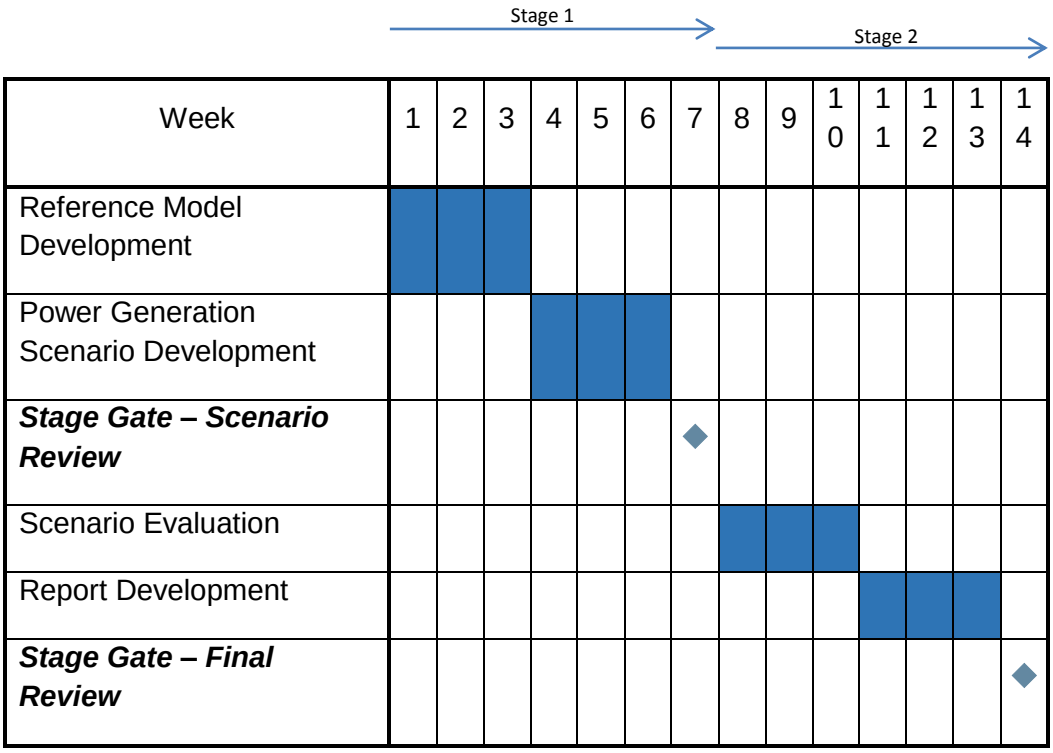
Power Analytics firmly believes that a stage-gate approach is required to ensure that all project deliverables meet the client's requirements. We recommend several in-person meetings with the client at the following stages: initial Energy Alignment Plan; base-case power model development; scenario development; and, presentation of the optimal scenario selection.

Prior to the initial presentation of the scenarios, Power Analytics will develop a high-level portrait of each proposed scenario for easy comparison. These scenarios will be

presented at the meeting(s), and will be used to develop the implementation plan. This comprehensive step-by-step approach, addressing both strategic planning and tactical technical assistance, provides better control over short-term and long-term energy production and usage, and overall costs.

General Schedule of Work

Work on the **Energy Alignment Strategy** begins upon contract signing, and completion generally takes about 14 weeks, according to the following schedule:



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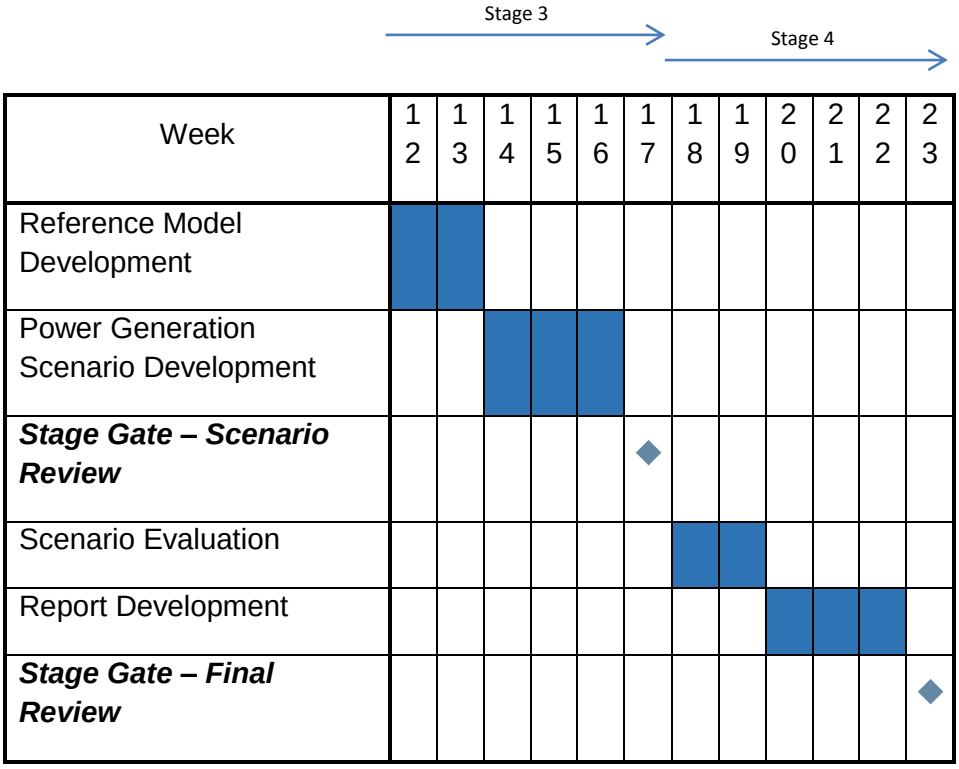
The **Energy Master Plan** is developed after the strategic Energy Alignment Plan has been completed and approved by the client. Work on the Energy Master Plan generally begins between weeks 12 and 24, and will be developed according to the following schedule:



We at Power Analytics look forward to discussing your microgrid plans with you and getting your Energy Alignment Plan underway.