

SELECTED TEAM-BASED, SEMESTER PROJECTS

2010: Role of Solar Energy in Achieving California Goal of 33% Renewable Power Generation by 2020.

Assessment of the role to be played by solar energy in achieving California's goal of deriving a third of its electricity from renewable sources by 2020. Issues to be considered include, but are not restricted to:

- current status of California's power generation and distribution system, including existing sources of renewable energy,
- projections of growth in demand for electricity and the extent to which growth can be reduced by energy efficiency measures, and the
- role to be played by solar energy in meeting projected demand for 2020.

Issues to be considered include, but are not restricted to:

- assessment of solar technology options (solar thermal and photovoltaic) and trade-offs related to efficiency and cost;
- relative contributions of distributed (roof-top units) and central (solar farms) sources of power;
- means of dealing with intermittent generation, particularly by central power stations, including options for energy storage and/or auxiliary power;
- inadequacies of the existing grid including the need for expansion to transmit power from remote sites to locations of large demand and role to be played by a *smart grid* in maximizing benefits from distributed sources; and
- land and water requirements, including related environmental matters.

2012: Potential of Wind Energy to Meet Nation's 2030 Power Generation Needs.

Assessment of the role to be played by wind energy in meeting the nation's needs for electricity in the year 2030. Issues to be considered include, but are not restricted to:

- the current status of the U.S. power generation and distribution system, including existing sources of fossil, nuclear and renewable energy;

- projections of growth in the demand for electricity to the year 2030, including the extent to which growth can be reduced by energy efficiency measures;
- the role to be played by wind energy in meeting projected demand for 2030.

With respect to the role of wind energy, issues to be considered include, but are not restricted to:

- the economics of wind power for land-based (on-shore) and off-shore wind farms, including returns on invested capital;
- potential advancements in wind energy technologies and the impact on costs and performance;
- the economics of wind power relative to other power generation options (coal, natural gas and nuclear) and the role of subsidies in maintaining the cost competitiveness of wind;
- the politics of wind power at the state, regional and national levels and short- and long-term policies that would concurrently benefit the electric power industry and rate payers;
- the effect of renewable portfolio standards imposed at the state, regional and/or federal levels;
- the effect of a possible cap and/or price on carbon emissions;
- preferred sites (on- and/or off-shore) for wind farm development in the U.S. and related environmental and permitting considerations;
- means of dealing with the intermittent nature of wind power, including options for energy storage, demand management and/or the use of hybrid power generation; and
- limitations imposed by the grid on transmission of wind power and barriers (economic, political and environmental) to expansion of the grid.

2015: Strategic Plan for Development of Light Duty Vehicles

The firm for which you work has been contracted by a global manufacturer of light duty vehicles to provide a strategic plan for ensuring competitiveness of its products through the year 2035. You and five of your colleagues have been assigned to a team responsible for developing the plan, which will be used by the company to guide its investments in product development and manufacturing operations, as well as global marketing and sales. Your final report must include:

- the current status of the global market, including annual LDV sales and portions of the market held by the following technology types: conventional gasoline, conventional diesel, hybrid, plug-in hybrid (PHEV), battery-electric (BEV), compressed natural gas (CNG), and fuel cell (FC);

- projected growth in annual vehicle sales through 2035, and changes in the market share held by each technology type, accounting for conditions that may vary from one nation or region to another; and
- specific recommendations for product development, differentiated if necessary according to different national or regional needs.

Issues to be considered include, but are not restricted to:

- the status of existing vehicle technologies and the potential for technology advancements over the 20 year period; considerations should include:
 - gasoline and diesel engine power trains;
 - battery technologies for PHEVs and EVs, related charging requirements, and linkages to the electric grid including evolution of smart grids supplied by renewable and intermittent sources of electricity;
 - automotive CNG and FC technologies and related refueling requirements;
- the effect of trends and regional variations in the production and price of oil, natural gas, biofuels and electricity;
- life-cycle costs of ownership;
- the effect of policy measures such as CAFE standards, a cap and/or tax on carbon emissions and restrictions on other vehicle emissions;
- population and economic growth, particularly in emerging markets of Asia, Latin America and Africa;
- the effect of urbanization and competition from alternative modes of transportation; and
- the effect of changing demographics and lifestyle preferences