DRAFT
Energy Section - Outline
SF POP TF
12/11/2008

Notes: Text in *italics* is not intended for inclusion in final draft, it is for explanatory or descriptive purposes only.

Introduction

At its core the issue of Peak Oil is about energy, and in that sense, this entire report is about energy, so it raises the question, why have a distinct energy section and what should be in it? The Resolution Establishing the Peak Oil Preparedness Task Force directed the Task Force specifically to assess "current modes of electricity generation and transmission, and the feasibility of distributed generation alternatives."[(Citation - resolution)] This section embodies a response to that directive.

Energy generation, transmission, distribution, and end use is an enormous issue. This section does not attempt or pretend to address every aspect of the energy sector. Rather, it will focus on the impacts that peak oil and peak natural gas will have on the City and County of San Francisco (City), and the practical, constructive measures the City may choose to implement in response. Early in its deliberations, the Task Force recognized that in order to adequately address issues such as electricity generation, the other two primary fossil fuels involved in electricity generation, natural gas and coal, would need to be included. Therefore, this section does assess the degree to which the City depends on natural gas and coal for electricity generation, and the risks associated with that dependency.

In recent years, San Francisco and many other cities have adopted programs aimed at reducing greenhouse gas emissions. Responses to concerns about the peaking of fossil fuel supplies must not counteract these programs. Fortuitously there is a confluence of interest in this matter in that the primary response that most effectively addresses both problems is the same: reduce and eventually eliminate fossil fuel use. However, this seemingly common sense response is not necessarily the case. There do exist strong proponents of a coal-based approach to mitigating declines in petroleum supply.

I. Assessment of Current Reality

a. Total Energy Generation/Usage Flow Chart
(Text here will describe flow chart)

b. Three Principal Energy Sinks *(As reflected in the chart)*

i. Vehicle Fuel (Includes non-personal vehicles)
The Task Force Report includes a section dedicated to the issue of Transportation. Please refer to that section for more information regarding

that sector. Some modes of transportation depend on grid electricity. In addition, some scenarios for future mobility include substantial increases in the availability and use of plug-in hybrid electric vehicles (PHEVs) and pure Electric Vehicles (EVs), as well as electrification of currently non-electrified transit lines. In these scenarios, significant increases in the load on the electrical utility are projected. The City must anticipate this potential increase in its forecasts.

1. Trips within SF
2. Trips to/from SF

ii. Electrical Generation

1. PG&E (Projected Power Mix - 2008) (citation - PG&E)

PG&E is a private corporation that provides natural gas and electric service to approximately 15 million people in a 70,000 square mile service area in northern and central California that includes San Francisco, but excluding power for municipal buildings and services.(citation - PG&E)

a. 44% Natural Gas
b. 22% Nuclear

Nuclear fission power should not be included in the City's raft of options for addressing peak oil & gas. Once these plants are decommissioned, new sources must emerge to take their place. Nuclear power… *(All of the damning bad news that's fit to print)*

c. 17% Large Hydroelectric
d. 14% Renewable
    i. Wind (2%)
    ii. Solar (<1%)
    iii. Geothermal (4%)
    iv. Biomass (4%)
    v. Small hydroelectric (4%)

2. San Francisco Public Utilities Commission (SFPUC)

Provides electric power to meet the municipal requirements of the City, including power to operate Muni streetcars and electric buses, street and traffic lights, municipal buildings and other City facilities, including the airport. This comprises ____% total electrical power use in the City.(Citation - SFPUC)

iii. Direct Use of Natural Gas

1. Residential
    a. Space Heating
    b. Water Heating
2. Commercial
    a. Industrial Process Use
        i. Co-generation
    b. Space Heating

c. Water Heating

iv. Petroleum not part of electricity generation power mix
(This bullet will discuss the fact that although oil is not used directly for power generation in the City power mix, oil is necessary in the "platform" that allows non-petroleum energy systems to function)

II. Vulnerabilities.

The principal vulnerability is that so much, nearly all, of the sources of energy that we use to power our lives in San Francisco are fossil fuel sources.

a. Oil *(This will be covered very briefly here because it will be addressed in other areas of the Report)*
   i. Price
   ii. Supply

b. Natural Gas
   i. Price
   It is likely that the price of natural gas will be the limiting factor before actual economically significant shortages of supply become a reality. The eventual high prices due to competition and other factors will render natural gas effectively unavailable. Prices are notoriously difficult to predict with accuracy. Therefore, the Task Force recommends that the City adopt a general policy of erring on the side of high price estimates when conducting forecasts in this regard. For the periods when high estimated prices do not materialize, the City and consumers will benefit by unexpectedly lower prices. If prices are at or above anticipated estimates, the City will be better prepared than if lower estimates had been used.
   ii. Supply
   Natural gas production peaked in the U.S. in 1973.(citation - High Noon for Natural Gas)
   California and San Francisco increasingly rely on imported natural gas. (See graphic?)
      1. Space Heating. (x%) of natural gas consumed by the City is used to heat homes and businesses…
      2. Water Heating. (x%) of natural gas consumed by the City is used to heat water for homes and businesses…
      3. Electric Utility (already addressed above)

c. Coal
   i. Price
   ii. Supply

d. Geographic Characteristics

San Francisco is perched at the end of a long narrow peninsula…
(Note somewhere in report that the fact that we are surrounded by water may be advantageous in some respects)

III. Mitigation Strategies

a. Demand Side Management

Demand reduction may turn out to be the single most important response in addressing peak oil & gas. All of the alternative and renewable energy possibilities will likely only fill a fraction of current energy demands. *(This section will contain an assessment of how much energy can be saved by maximizing energy efficiency)*

A critical component of implementing demand mitigation measures is having the trained workforce available to do the actual work of retrofitting buildings and installing cleaner more energy efficient systems.

i. Conservation

Strictly speaking, conservation and energy efficiency are two different things, but they are closely related. Energy efficiency is a form of conservation. Energy efficiency means using a low wattage compact fluorescent light bulb that puts out as much light as a higher watt incandescent bulb. Conservation means turning off the light. Most of what this report will recommend falls under the category of energy efficiency technology implementation. However, the Task Force feels that the City should not forget the value of promoting conservation as a public education imperative.

ii. Energy Efficiency

Energy Efficiency measures have the potential to give the City the greatest "bang for the buck" in terms of mitigating demand. (*Cite some figures or reference to chart*). Powerful momentum is building on a national level to inaugurate a "green economy" that will be comprised of thousands newly trained in "green collar jobs" to retrofit existing homes and businesses with things as simple as weather-stripping and water heater jacketing to installing the latest energy efficient technologies. The City can take a lead in this arena by establishing a green jobs workforce development program to train and place people in this vocation.

iii. Smart Grid

The "smart grid" concept is basically creating an energy Internet - replacing the conventional system of monolithic, centralized power generation with little ability for the generator to communicate with the consumer within the system. The smart grid is a decentralized system where a web of interactive electronic communication exists between large generation centers, distribution nodes, smaller distributed generation, and end users. Advantages of the smart grid are that it increases efficiency, reduces peak demand, and allows for small, distributed renewable energy generators.(citation - multiple sources)

b. Supply Side Management

(This section will contain an assessment of how much energy can be generated in the city by each method. Combining the theoretical maximum of solar in SF, plus the Community Choice Aggregation plan to put solar and wind along the Hetch-Hetchy

corridor, plus CCA's energy use reduction plan, to get a picture of what the prospects are for powering the City)

As with demand management, a trained workforce will be needed to do the work of installing new cleaner, renewable energy infrastructure.

i. Community Choice Aggregation (CCA)
ii. Feed-in Tariffs

A feed-in tariff is a mechanism that allows small renewable generators to sell their power to utilities at predefined terms and conditions. In early 2008 the California Public Utilities Commission (CPUC) made new feed-in tariffs available for the purchase of up to 480 MW of renewable generating capacity from small facilities.(Citation - CPUC) Pursuant to this, effective February 2008, PG&E will purchase power from our customers who install eligible renewable generation up to 1.5 MW in size.(Citation PG&E)

iii. Renewable Energy "Roadmap"

Currently, no comprehensive plan exists that would result in the City ceasing its dependence on fossil fuels. The City - SFE, SFPUC - should produce a plan that would do so, combining robust energy demand reduction with aggressively increased cleaner renewable energy infrastructure investments. Such a plan should have near 100% clean renewable energy as its objective. *(Combine with the revised ERP?)*

iv. Renewable Energy Infrastructure Implementation

The key to risk mitigation in this arena is diversification. There is no single energy source currently known that can replace petroleum or natural gas. It is also unlikely that any combination of known non-fossil, non-nuclear alternatives will be able to meet current or projected demand. However, some combination of all non-fossil alternatives combined with robust programs of conservation, energy efficiency, and localization, may be the best way to approach mitigation. An aggressive program, whether in the context of CCA or not, will be an inevitable key to transitioning out of the fossil fuel era.

1. Solar Photovoltaic
    a. Distributed
    b. Concentrated Solar Power (CSP)
2. Solar Thermal
3. Wave Power
4. Tidal Power

Between 2001 and 2008 the CITY investigated the possibility of harnessing the power of the tidal current flowing through the Golden Gate into and out of the San Francisco Bay. Currently the investigation is on indefinite hold.(citation - Broomhead) *(More here about why not)*

5. Wind
    a. Urban (land-based) Wind
    b. Offshore Wind
6. Geothermal
    a. Conventional
    b. Enhanced

IV. Recommendations

(These are not currently prioritized and may end up being categorized/condensed, and will certainly be prioritized)

a. **Initiate a Formal Interagency Request for Information and Advisement.** The City should initiate a formal inquiry submitted to appropriate state and/or federal *(maybe even international?)* agency/s (DoE, EIA, IEA, etc.) seeking information and guidance on the issue, specifically seeking recommendations on long range risk management and advance mitigation measures. *(Perhaps pointing to Hirsh Report and/or more recent info, or based on recent gas/oil price volatility, or all of the above.)*

b. **Community Choice Aggregation**. The City should reassert Community Choice Aggregation as a central organizing principle in the effort to advance the rapid implementation of sustainable renewable energy systems. *(more)*

c. **Establish a "Division of Energy and Fuel Transition."** The City should establish the "Division of Energy and Fuel Transition" (DEFT) within SFE or the SFPUC. Such a Division would be responsible for:
    i. Infrastructure investment analysis that takes into account a constricting fossil fuel universe
    ii. Operating an "Energy Transition Resource Center" that would provide information and services to residents and businesses to assist them in "de-carbonizing" their energy consumption
    iii. (more)

d. **Roadmap to Sustainability.** *(Or the Renewable Energy Roadmap?)* The City should direct SFE and SFPUC to work together to produce a new integrated long term energy/electricity resource plan similar to the 2002 ERP, retaining consideration of the drivers of that effort (environmental justice, public health, and energy deregulation) but updated to take into account fossil fuel scarcity considerations, and explicitly incorporating the goal of ending dependency on fossil fuels. The plan should also include a requirement that, once the report is published, several follow-up public meetings in the months and years ahead should be held to address the status of implementation of the plan.

e. **Renewable energy Portfolio Diversification.** The City should adopt an approach that seeks to diversify to the greatest extent possible its renewable energy portfolio. Such a diverse portfolio would include (but by no means be limited to) robust programs to implement the following:
    i. The City should promote solar thermal to offset the (x%) natural gas used to heat water
    ii. (more)

f. **Smart Grid.** The City should embrace and embark on a program to implement Smart Grid technology.*(More)* For further information on smart grid development

the TF recommends that appropriate City staff review the following reports and documents:

i. U.S. Dept. of Energy "The Smart Grid: An Introduction" http://www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages.pdf

g. **Adopt Policy of Assuming Higher Fossil Fuel Prices.** The City should adopt a general policy of erring on the side of high price estimates when conducting forecasts of the price of fossil fuels. *(more rationale here)*

h. **Green Jobs Workforce Development.** The City should establish a green jobs workforce development program to train and place people in the skills required to install new, or upgrade, repair, reconstruct, replace, or expand existing energy efficiency infrastructure.

i. **Waste Inventory Program.** The City should initiate an investigation into where the greatest amounts of energy waste can be found, e.g., wasted heat from industrial processes. Restaurants may be one of the biggest opportunities for eliminating waste. (*Maybe an SF green restaurant movement of some sort)*

j. **Feed-In Tariffs.** *(Since PG&E is already doing this under AB1969 and CPUC supervision, see if there is anything the City might be able to do in this arena).*

k. **Phase-outs and Bans.** The City should consider ordinances to ban/minimize (?) sale and/or use of certain energy inefficient fixtures and appliances such as incandescent bulbs *(and other obsolete energy inefficient appliances - list*) in the City *(cite other City's actions)*

l. **Localization.** *(Maybe here, maybe somewhere else in the Report, or in the overall recommendations)*

m. **Implement the Oil Depletion Protocol.** *(Also probably in the overall recommendations)*

n. More