MEETING NOTICE
AND AGENDA

ENERGY WORKING GROUP
The Energy Working Group may take action on any item appearing on this agenda.

Thursday, March 27, 2008
11:30 a.m. to 2:00 p.m.

SANDAG, Seventh Floor Board Room
401 B Street, Suite 800
San Diego, CA 92101-4231

Staff Contact:  Brian Holland
(619) 699-6915
bho@sandag.org

AGENDA HIGHLIGHTS

• REGIONAL ENERGY STRATEGY UPDATE - TRANSPORTATION FUELS AND NATURAL GAS FORECASTS

• CLEAN TECH SAN DIEGO PRESENTATION

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ITEM #   RECOMMENDATION

1. WELCOME AND INTRODUCTIONS

+2. SUMMARY OF FEBRUARY 28, 2008, ENERGY WORKING GROUP (EWG) MEETING  APPROVE

The February 28, 2008, meeting summary is attached for the EWG review and approval.

3. PUBLIC COMMENT AND COMMUNICATIONS  COMMENT

Members of the public who would like to address the EWG on a topic not on the agenda should do so at this time. Speakers are limited to three minutes each.

4. UPDATE ON SANDAG TRANSMISSION PROJECTS ANALYSIS  DISCUSSION

Staff will provide an update on the Regional Planning Committee and Board of Directors’ consideration of the EWG transmission recommendation.

+5. EWG CHAIRPERSON SELECTION  RECOMMEND

The EWG is requested to discuss and recommend a new chairperson to replace outgoing Chairman Henry Abarbanel.

6. CLEAN TECH SAN DIEGO PRESENTATION  INFORMATION

Lisa Martin, Clean Tech San Diego, will make a presentation on that organization’s work in promoting the clean technology sector in the San Diego region with an emphasis on the economic development opportunities of clean energy.
+7. REGIONAL ENERGY STRATEGY UPDATE:
TRANSPORTATION FUELS EXISTING CONDITIONS AND FORECASTS

Staff will present the results of their analysis of natural gas and transportation fuels existing conditions and forecasts, to be included in the Regional Energy Strategy update. EWG members are asked to discuss the results and recommend any improvements that could be made.

8. SCHEDULING AGENDA ITEMS FOR FUTURE MEETINGS

EWG members are invited to suggest topics for the upcoming April 24, 2008, meeting.

9. ADJOURN

+ next to an item indicates an attachment
March 27, 2008

AGENDA ITEM NO.: 2

Action Requested: APPROVE

SUMMARY OF FEBRUARY 28, 2008, ENERGY WORKING GROUP (EWG) MEETING

AGENDA ITEM #1: WELCOME AND INTRODUCTIONS

The EWG Co-Chairman Henry Abarbanel, City of Del Mar, called the meeting to order at 11:35 a.m. and welcomed the group.

AGENDA ITEM #2: SUMMARY OF JANUARY 24, 2008, MEETING

Chairman Abarbanel asked working group members to look over the meeting summary and to contact Brian Holland if there were any changes that needed to be made.

AGENDA ITEM #3: PUBLIC COMMENT AND COMMUNICATIONS

Members of the public were given the opportunity to address the EWG on a topic not on the agenda. No public comments were made.

AGENDA ITEM #4: TRANSMISSION PROJECTS ANALYSIS

Chairman Abarbanel noted that the EWG and its subcommittee have been working for several months to analyze potential transmission projects to give guidance to the SANDAG Board of Directors. He thanked subcommittee members for their service. The recommendation to come out of the EWG will go to the Regional Planning Committee (RPC) and then to the board.

Chairman Abarbanel said he thought that the role of the group should be to speak truth to power. Using Energy 2030: The San Diego Regional Energy Strategy (RES), as a guide, members should try to examine the projects, and strive to represent the whole region in their decision, not just their own groups.

Brain Holland, SANDAG, said that there had been some questions raised about conflict of interest rules at the last subcommittee meeting, and he hoped to clarify those. The EWG is considered an advisory body, not a decision making body; therefore, it is not subject to the rules of the Political Reform Act. In the past, project proponents have been asked to recuse themselves from discussions, but this is not strictly necessary. All members are free to participate and vote if they wish, although they may also remove themselves if they wish to prevent any appearance of impropriety.
Laura Hunter, Environmental Health Coalition (EHC), said she had raised the concern to the subcommittee that Mike Evans, San Diego Regional Chamber of Commerce, had a financial interest in the Sunrise project and should recuse himself from voting. The EHC maintains that he should have recused himself, at least to reduce the appearance of impropriety, and that without his vote, the recommendation would not have passed. She said the EHC had drafted a letter and sent it to SANDAG staff, although the letter did not make it to the whole distribution list.

Chairman Abarbanel said that he respected Ms. Hunter’s concern, but it was not up to the working group to decide if an individual has a conflict of interest. An individual should decide to remove him or herself from a decision if there is a conflict. The Fair Political Practices Commission has ultimate authority over conflicts, not the working group. Ms. Hunter’s letter was copied and made available to EWG members.

Donna Frye, City of San Diego, said that it is in the public interest for members to identify and make public any financial interests they may have in the projects being discussed as they make motions, even if they are not compelled to recuse themselves from this advisory body.

Chairman Abarbanel said he hoped to have an orderly meeting starting with a report on the deliberations of the subcommittee. The group will then receive public testimony followed by discussion and deliberation following Robert’s Rules of Order.

Jennifer Porter, California Center for Sustainable Energy, noted that discussion of San Diego Gas and Electric’s (SDG&E) Sunrise Powerlink (SPL) has been ongoing for a number of years, and the EWG has also considered the Talega-Escondido/Valley-Serrano (TE-VS) transmission project proposed by Nevada Hydro. The TE-VS is not far along in the California Public Utilities Commission (CPUC) application process, and members can expect at least another year before the CPUC finishes its deliberations. Over the past few months, the subcommittee and working group have heard from proponents and opponents to the projects and others. The EWG is now tasked by the SANDAG Board of Directors to examine these projects based on their consistency with the RES. No findings are to be made on the relative merits of the two projects.

The goals of the RES are not ordered and include increased use of renewable resources, increased percentage of peak demand produced in region, and increased transmission capacity. On February 1, the subcommittee recommended continued processing by the CPUC of both projects, since they are both consistent with the RES Goal 5, which is to “increase the transmission system capacity as necessary to maintain required reliability and to promote better access to renewable resources and low-cost supply.” The motion passed with 4 in support, 3 against, and 1 abstention. The staff analysis found that both projects are consistent with the RES, although the projects have mixed effects on the goals. Increased transmission into the region may have a negative impact on in-basin generation and renewables. Alan Ball, Qualcomm, clarified that the goal of 50 percent in-basin renewables included all renewables, not just major utility projects.

Bill Powers, Sierra Club, clarified that the reason why the transmission projects may conflict with the goal for in-region capacity is that it would allow the South Bay Power Plant to drop off after 2010, so that it clearly conflicts with the goal by using later bench marks.

Alan Sweedler, San Diego State University, asked if there was any attempt to quantify the amount of renewable production available in the Imperial Valley. Mr. Ball indicated that the group did not
look at specific projects, but thought that the lack of transmission was the current limiting factor to development. The group also considered that the TE-VS project would allow greater access to projects in the upper Mojave and Tehachapi regions.

Rich Caputo, San Diego Renewable Energy Society, said he thought the staff did a good job analyzing the goals, but thought that we needed to discuss the guiding principles, too. At this point, Chairman Abarbanel opened the floor for public comment.

David Kates, Nevada Hydro, thanked the committee for the chance to present information on his project. As a small company, Nevada Hydro does not have extensive public relations resources, but hoped that the information that had been presented would be useful to the group in the deliberations. He also offered to answer any questions, should they arise.

The meeting was opened up to public comment.

Noting that the goals and guiding principles were made available to attendees, Ms. Frye asked Michael Shames, Utility Consumers Action Network, to expand on his assertion that the transmission projects did not meet the goals of the RES, specifically Goal 5. Mr. Shames said, although he was involved in the formulation of the RES, he did not remember specific references to transmission from Imperial County. Most of the discussion of transmission involved the transmission needed to support new local wind resources from the southeastern county. Building a line all the way over the mountains is difficult due to the risk of fire and earthquakes, and was not considered a serious option at the time. Ms. Porter noted that specific language relating to Imperial County was found in Goal 5, Implementation Strategy 2.

Ms. Frye said that she thought the staff and subcommittee recommendation specifically talked about goals, but did not see specific reference to the guiding principles that should inform all the goals. She did not see how the projects met a number of the guiding principles, including development of responsible energy supply and the protection of venerable communities. The projects also fail to support development of local jobs and/or balance benefits and costs against the impacts to the environment. Ms. Frye said she was concerned that the process was moving forward based only on the projects’ compliance with Goal 5 without considering their conflicts with many of the guiding principles. All the goals and guiding principles should be used in the analysis of the projects.

Ms. Hunter noted that there has been significant vetting of at least one of the projects, and that the working group should utilize the work that has already been performed. She invited Mr. Shames to answer some questions about the ongoing proceedings. Mr. Shames said that the Southwest Powerlink was nearly maxed out in terms of capacity, but currently carries mostly gas-fired generation, and could instead be used to carry energy from renewable sources. She asked how the line will affect distributed generation (DG). Mr. Shames said a smart grid could improve the ability to dispatch DG, but that major transmission lines in the region will impede the development of DG.

Chairman Abarbanel said that the EWG had drafted a letter to SDG&E in 2006, noting that they had made progress on many of the goals of the RES except for DG, and that SDG&E had committed to doing more to promote DG. In order to move the discussion along, he proposed a motion and asked
that the discussion be limited to that motion. Copies of the motion were distributed to attendees (final motion is attached).

Paul O’Neal, Paul L. O’Neal and Associates, seconded the motion, noting that he has worked with Nevada Hydro developing public relations strategies.

Mr. Evans noted that the motion assumes that Lake Elsinore Advanced Pump Storage (LEAPS) is cheaper. There is testimony concerning how SPL would lead to a $146 annual savings for SDG&E ratepayers. On what basis can we make the assumption that it will provide a lower overall cost to ratepayers? Chairman Abarbanel said that his assumption was based simply on the cost of construction, and that we did not have a way to evaluate the costs. He asked if the representative from the project proponent had a more accurate assessment. Mr. Kates indicated that the TE-VS project would have the same benefits as the SPL, but that the cost to construct was much lower, so it can be assumed that the TE-VS project provides higher benefits. Mr. O’Neal said that SDG&E had previously testified that they wished they had gotten the Valley-Rainbow project built, as it would have helped them realize a $200-$400 million yearly savings.

Carrie Downey, City of Coronado, said that she has attended many of the public hearings on the SPL, and heard the public comments. She has also read many of the filings with the CPUC. Evaluating this project is a huge endeavor. This has been the most vetted transmission project in the state’s history. Although she has read the entire Draft Environmental Impact Report (DEIR), she has trouble drawing any conclusion one way or the other. The CPUC will continue to evaluate the project, but SANDAG can examine the impacts to the cities in the region. Chula Vista and Santee would both be affected by an alternative requiring more in-basin generation. The Environmental Impact Report (EIR) looked at cumulative impacts, not impacts in each city. There will be local sentiment against every single one of the alternatives proposed in the EIR. While the RES tried to do regional goals, the DEIR illuminates localized impacts. These impacts may come up when the board reviews it. For the purpose of disclosure, she said that she had no direct financial interest in either project, but has worked for the Imperial Irrigation District, which has an obvious stake in both projects. She will not vote either way.

Steve Zolezzi, Food and Beverage Association, said that mile-for-mile, the costs are the same for both projects, one just happens to be shorter. Although he has sympathy for those who face impacts from the proposed projects, reliable energy is a necessity for the region. Business cannot operate if the power is not on. The needs for the many take precedent over the needs of the few. At the discussion in the subcommittee, there was no ranking between the projects. Mr. Zolezzi asked to make a substitute motion which strikes the reference to the LEAPS project as a higher priority. Mr. Evans seconded the motion. Ms. Frye clarified that a motion cannot simply be substituted with a second; it has to be voted on. The vote was five-five, and the motion failed.

Mr. Ball proposed an amendment, which complemented the proposed substitute motion, but instead of just removing reference to the LEAPS project, would recommend that the preferred option represent the most efficient use of resources including ratepayers’ dollars. Jim McCollum, Industrial Environmental Association, seconded.

Chairman Abarbanel clarified that the motion finds both lines inconsistent with the goals of the RES, but that if the board chooses to endorse a transmission project, the EWG recommends that a higher priority be accorded to the one that represents the most efficient use of resources.
Dave Carey, Port of San Diego, said that he thought that the motion incorrectly paraphrases the RES, referring to “low-cost supply” when the RES refers to “competitive priced supply.” Upon further analysis, it was determined that the RES uses both phrasings, and that the words from the full plan, not the executive summary, should be used in the motion.

Mr. Caputo mentioned that the subcommittee had missed the guiding principles, and that the first and last guiding principles say projects should be environmentally sound and have positive cost-benefits compared to impacts. Using the DEIR, we can see that one project has substantially less impacts than the other. This should be used in the recommendation to the board. He also thought it was key to only pursue transmission “as necessary,” since there is a point where additional transmission will not be necessary. Because of the loading as renewables come online, they will push fossil fuels off.

Dave Geier, SDG&E, noted that the motion should refer to the DEIR as comments are still being collected, and the final EIR has not yet been completed. Also, no single project will be fully consistent with all the goals and guiding principles. So it might not be fair to hold these projects to that standard.

Chairman Art Madrid, City of La Mesa, said he has been very impressed by the way everyone has made their voices heard. He also said that whatever actions the EWG takes, it should keep in mind that climate change is a very real problem. The Attorney General has made clear that he will pursue litigation against entities that do not include climate change or other environmental concerns into their planning. He also said that technology is rapidly changing, and that what we vote for may be obsolete soon after. He also invited those who do not support the final action of the working group to submit a minority report, and also to come to board meetings to make sure their voices are not simply dismissed.

Mr. Zolezzi noted that although explicit reference to LEAPS was removed from the motion, the most cost-effective alternative implicitly refers to the project. He also thought it was not fair to call both projects inconsistent with the RES, since no project will be fully consistent with it. Favoring one project over another is not the fairest way to do this, nor is it consistent with the discussion of the subcommittee.

Mr. Shames said that there are proposals that could be consistent with the RES that the group has not considered. It is hard for a single project to be consistent with all the goals, but there are a series of projects that could be.

Mr. O’Neal asked for the motion to be read. Upon review of the language, Ms. Hunter asked if the word “resources” in the final paragraph should be clearly defined to include the environment. After discussion of the value of being inclusive versus specific for the consideration of the board, Ms. Hunter moved to amend the last paragraph to include the words “and has the minimum impact on community health and the environment.” Ms. Frye seconded that amendment, which passed. She also asked for clarification that the motion included the proper language for Goal 5 of the RES and referenced both the goals and guiding principles of the RES.

Mr. Carey asked for changes to the language of the motion to reflect the fact that the DEIR did not directly say that no transmission was necessary, and also to reflect the fact that both projects may
be consistent with Goal 5, although no project is fully consistent. Julie Wiley, SANDAG counsel, informed the group that it was up to the originator of the motion to accept or deny changes. It did not need to be voted on.

Chairman Abarbanel declined to amend the language and then called the question on the motion as previously stated.

The first vote on the motion was 10 in favor, 5 opposed, and 6 abstentions. Since there were 21 members present, the motion did not pass by a majority of the members present. Subsequently, six working group members left the meeting voluntarily. Another vote on the same motion was taken and passed by a vote of ten in favor and five opposed. The motion then passed by a majority of the voting members present.

**AGENDA ITEM #5: SCHEDULING AGENDA ITEMS FOR FUTURE MEETINGS**

This item was not considered.

**AGENDA ITEM #6: ADJOURN**

The meeting was adjourned at 1:51 p.m. The next meeting will be March 27, 2008.
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Donna Tisdale - Boulevard CPB
Michael Shames - Utility Consumers Action Network
Denise Morse – Mountain Empire CPB
Curt Dowds -- The Renewable Choice
Diane Conklin – Mussey Grade Road Alliance
Joe Bosseler – Silverwood Energy
David Kates – Nevada Hydro
Micah Mitrosky - Sierra Club
Raymond Lutz – Citizen’s Oversight
Jim Cron – American Standard Renewable Fuels
Alexandra Hart – IBEW 569
Julie Gelfat – IBEW 569
Sephra Ninow – CCSE
Jennifer Porter – CCSE
Kevin Murphy - CH2M Hill
Bob Leiter – SANDAG
Rob Rundle - SANDAG
Brian Holland – SANDAG
Kevin Wood – SANDAG

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EWG CHAIRPERSON SELECTION

Introduction

The Honorable Henry Abarbanel and Mayor Art Madrid have resigned as co-chairs of the EWG, effective after the March 27 EWG Meeting. The Honorable Carrie Downey, council member from the City of Coronado and representing the South County subregion on the EWG, has been recommended by the Regional Planning Committee to chair the EWG, beginning with the April 24 EWG Meeting.

Recommendation

The EWG Charter states that the EWG is to vote to approve the new chair. The EWG is asked to vote on accepting the Honorable Carrie Downey as the new chair of the EWG.

A Message of Thanks to Our Outgoing Chairs

The EWG would like to thank its first co-chairs, the Honorable Henry Abarbanel and Mayor Art Madrid, for their work and dedication in promoting the Regional Energy Strategy and developing an energy program within SANDAG.

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REGIONAL ENERGY STRATEGY UPDATE: TRANSPORTATION FUELS
EXISTING CONDITIONS AND FORECASTS

Introduction

Transportation fuels will be a new component of the Regional Energy Strategy (RES) under the current update. Staff is preparing the Energy Background chapter of the RES, which will describe existing conditions, trends and forecasts for transportation fuels, natural gas, and electricity. Staff will present the results of its transportation fuel and natural gas analysis, and request comments from the EWG.

The following transportation fuels section of the Energy Background chapter is a working draft, with certain passages that remain incomplete. The EWG is asked to review the completed passages and suggest changes, and to recommend other subject headings that may need to be included.

TRANSPORTATION FUELS

TRAVEL DEMAND

Travel behavior is influenced by many factors, including demographics, land uses, lifestyles, the economy, employment locations, and work practices. Travel demand can be expressed by the number of motorized trips taken and by the number of miles traveled (vehicles miles traveled, or VMT). The region’s population currently makes an estimated 16.7 million trips daily, an increase of approximately 85 percent over 1990 levels. These trips account for over 85 million vehicle miles traveled per day on the region’s roads.

Trips and VMT are both increasing significantly faster than population growth. By 2030, the region’s population is expected to travel 111 million miles daily, an increase of 31 percent over current conditions.

Like most major metropolitan regions around the country, the San Diego region has seen a gradual decline in commuting by carpool and transit in favor of driving alone. Between 1990 and 2000, the percentage of residents who drove alone to work increased, while commuting by all other modes decreased or stayed the same.
VEHICLE FUEL EFFICIENCY

The California Air Resources Board provides fuel efficiency assumptions for the California fleet in its EMFAC air quality model. EMFAC uses a baseline average fuel efficiency figure of 25.1 miles per gallon gasoline (mpg) for the current model year light duty vehicle fleet. Because earlier model year, less-efficient vehicles are on the road, average fuel efficiency across the entire light duty fleet is lower, at an estimated 20.5 mpg in 2006.

FUELS AND INFRASTRUCTURE

Regional Gasoline and Diesel Consumption

In 2006, the region consumed approximately 1.6 trillion gallons of gasoline in on-road transportation, an increase of 14 percent over 1990 levels. Under a business-as-usual scenario, annual gasoline consumption would increase to approximately 2.1 million gallons in 2030. However, implementation of the Pavley fuel efficiency standards (developed under California Assembly Bill 1493) would reduce regional gasoline demand by approximately 33 percent to 1.4 trillion gallons by 2030.

On-road diesel consumption increased 80 percent between 1990 and 2006 to 195 million gallons. By 2030, diesel consumption is projected to increase to approximately 241 million gallons under business-as-usual conditions.

Fuel Origin and Distribution

Petroleum Origin

United States petroleum production peaked in 1970 at around 11.6 mmbd, and domestic production has since declined steadily, to approximately 8.3 mmbd in 2006. The gap between domestic supply and demand has been increasingly filled by imports. In 2005, approximately 60 percent of California supply was produced in the United States, with 20 percent of the total supply originating in Alaska and 40 percent in California. Of the remaining 40 percent that was imported from abroad, the most significant sources were Saudi Arabia (14 percent of total supply), Ecuador (10 percent), Iraq (5 percent), and Mexico (3 percent). The San Diego region does not produce any significant quantity of petroleum.

Gasoline Origin and Distribution

San Diego County is part of a larger fuel distribution region in the southwestern United States, centered around the Los Angeles refinery center. The region—which includes counties in Southern California as well as exports to Arizona, New Mexico, and parts of Nevada—is supplied by refineries in Los Angeles and by imports of finished gasoline and blending components received at the Port of Los Angeles. Gasoline is imported from Washington State, Gulf of Mexico states, and foreign sources, predominately in East Asia and Western Europe. California is not connected by pipeline to other oil refining centers, so all imports must arrive by ship. Out-of-state imports account for approximately ten percent of gasoline consumed in California, with the remaining 90 percent refined in-state. No refineries are found in the San Diego region.
All gasoline delivered to the San Diego region arrives through one Kinder Morgan pipeline that originates in the Los Angeles refinery center and ends at the Kinder Morgan terminal in Mission Valley.

**Fueling Stations in the Region**
From the Mission Valley terminal, gasoline is trucked to fuel stations throughout the County. As of 2002, there were approximately 761 fueling stations in San Diego County, resulting in a lower density of stations than the other major metropolitan areas of California.iv

**Trends in Transportation Fuels**

[Text]

**REGULATORY TRENDS**

[Text]

**State**

[Text]

**Federal**

[Text]

**MARKET TRENDS—GASOLINE AND OIL PRICES**

Gasoline prices are determined by four primary elements:

- **Petroleum costs.** Oil price is the single largest cost component in producing gasoline and diesel, accounting for between 42 and 56 percent of the price of regular gasoline in 2007.v For every one dollar increase of the cost of a barrel of crude oil, there is an average increase of about 2.5-cents per gallon of gasoline.

- **Taxes.** Taxes on gasoline include a federal excise tax of 18 cents per gallon, a state excise tax also of 18 cents per gallon, and state and local sales taxes that depend on the price of gasoline. In December 2007, state and local sales taxes amounted to approximately 24 cents per gallon. At that time, all taxes amounted to approximately 18 percent of the cost of gasoline in the San Diego region.

- **Refining costs and profits.** Refining costs include all costs associated with crude oil processing, oxygenate/ethanol, product shipment and storage, oil spill fees, depreciation, gasoline storage to cover refinery shortages. This element also includes the refinery profit margin.
• **Distribution and marketing costs and profits.** This element includes all costs associated with the distribution and retailing of motor fuel, as well as profits taken by the gasoline dealer.

As of xxxx, regular unleaded prices in San Diego County averaged xxxx

The period from 2000 to 2008 saw significant volatility in gasoline prices, with an overall trend towards substantially higher prices at the pump. Prices for regular unleaded gasoline in California generally decreased in the early years of the decade, settling to a low of $1.10 in December 2001. Between December 2002 and March 2003, prices rapidly rose 63 cents to $2.15 per gallon, and then declined again to $1.60 per gallon by the end of 2003. Since then, gasoline has steadily become more expensive, rising to an all-time high of xxxx per gallon in xxxx.vi

The causes underlying volatility and escalation in gasoline prices since 2000 can be traced to several factors. Most fundamentally, gasoline has followed rising crude prices. Gasoline prices have also been impacted by insufficient refining and storage capacity, pipeline outages, and logistical expenses associated with the switch from MTBE to ethanol as an oxygenate in California Reformulated Gasoline in 2003 and 2004.

Refinery outages are an unavoidable occurrence in the transportation fuel sector, and generally shortfalls can be covered through increased gasoline imports or increased activity at other regional refineries. However, refinery capacity growth in Southern California has not kept pace with gasoline demand growth in the southwestern U.S., resulting in a tighter market in the event of an unplanned outage and an increasing reliance on gasoline imports. Even when imports can cover losses from a refinery outage, they may not arrive for several days, as California is not connected to other oil refining areas by pipelines and must rely on shipments to the Port of LA. The closest refineries that can produce California Reformulated Gasoline are in Washington State.

**PETROLEUM PRICES**

As noted above, the most significant determinant of gasoline prices is the price of oil, and both have been on an upward trajectory for several years. The Brent crude benchmark price in January 2008 hovered around $100/bbl, an 86 percent increase from January 2007 levels of $53.68/bbl. Between January 2000 and January 2008, crude prices rose almost 400 percent, from $25.51/bbl at the start of the decade.vii The following passages describe the dynamics of the oil market and the factors that may influence oil prices in the next two decades.

**Global Market, Local Impacts**

Oil prices have a tremendous effect on local gasoline prices and the local economy. However, the price of oil is established in a liberalized global market. Neither oil companies nor governments have the exclusive power to “set” the price of oil. Rather, a price emerges from trading activity that balances supply and demand and clears the market of available oil. The oil market is affected by a wide variety of political, economic, technological and geological influences that are beyond the control of federal, state, or local governments. It is critical that the region recognize the global forces that impact not only regional gasoline prices and travel demand, but also the prices of a
broad spectrum of goods that are dependent upon oil, including food, building materials, petrochemicals and plastics, and imported items.

**Surging Demand**

**Struggling Supply**

Between 2000 and 2006, global supply increased by approximately 10 percent, or 7.7 mmbd. In June 2006, production leveled off at 85.5 mmbd and remained on a plateau for 18 months, until December 2007. This pause in production occurred at a time of strong demand growth and was a major factor in the run-up to record-high prices. The following sections provide some explanation for the stagnant supply conditions in 2006 and 2007.

**Geopolitical Constraints**

An increasing share of oil reserves and production is controlled by national oil companies, as opposed to private, investor-owned firms. All of the top ten reserves holders and 14 of the top 20 producers are nationalized firms. The concentration of oil production in state hands introduces an element of uncertainty that is not presented by private firms, as governments are capable of manipulating the market for political ends. One study found that more than 60 percent of world oil reserves are in countries where political conditions could constrain oil production.

National oil companies have at times restricted production to influence prices and have entered into long-term contracts with political allies rather than allowing market-based allocation of their product. Oil traders view this type of market distortion as a threat to accessing affordable, reliable supplies. Further, national oil companies rarely have the technical expertise of private firms, and have been known to mismanage reserves at the expense of production rates and reliable supply. Finally, oil prices today include “risk premium” that reflects the danger of supply interruption due to social or political unrest in important oil-producing regions such as the Middle East, Nigeria, Venezuela, and Russia. In an era of tight market conditions, any such interruption would put considerable upward pressure on global prices. These geopolitical risks and constraints are only likely to intensify over the coming years as available oil is increasingly concentrated in national oil companies and volatile regions.

**Escalating Costs**

The cost of drilling wells and extracting oil has followed an upward trajectory over the past several years, due to a combination of factors. The availability of drilling equipment and component parts has been limited, and virtually all drilling rigs are currently in use. An aging industry workforce is also stretched to its limit. A study released in October by Cambridge Energy Research Associates (CERA) concluded there could be a 10% to 15% "people deficit" in the oil industry globally by 2010.

In addition to a limited and costly supply of labor and equipment, remaining oil reserves are less accessible than in the past. In order to maximize returns, oil companies have historically exploited the least-cost reservoirs first, leaving the more difficult oil behind. Approximately half of the world’s original endowment of oil has been exploited, leaving a second half that is more costly to produce. Remaining reserves are more likely to include heavy or high-sulfur oil that is difficult to refine, or oil mixed with water or gas that must be separated out. Many of these fields are found in inaccessible locations such as deep-water or arctic regions. From exploration and drilling to
pumping and refining, production processes have become more costly as much of the easiest, highest quality oil has been exhausted.

THE PEAKING OF WORLD OIL PRODUCTION

The end of oil has been predicted since it was first pumped out of the ground in the 19th century. Forecasts that society will run out of oil have been invariably off-base to this point, but these errors should not obscure the fact that oil is a non-renewable resource with a limited supply that will one day be exhausted. Long before the day that oil “runs out,” however, oil production rates will reach a peak and begin to decline. Unless mitigation strategies are implemented well in advance, this peaking of world oil production (sometimes referred to as “peak oil”) will place a permanent and increasingly severe constraint on oil supply that will result in highly elevated price levels and potential supply shortages.

The debate on peak oil primarily revolves around the date of its onset, rather than the validity of the concept itself. The following section will describe the concept in more detail, and will offer two possible scenarios for peak oil timing.

Reserves versus Flows
Reserves data is important for understanding the volumes and sources of oil that can be extracted in the future, and at what cost. At the end of 2006, 1.2 trillion barrels were stated as proved reserves. These reserves would sustain the world for decades at current production rates. The peak oil concept is not concerned primarily with total reserves or with forecasting when those reserves might run out, however. Rather, peak oil addresses the question of production rates or flows, usually measured in millions of barrels per day. These flows must increase over time to keep pace with demand.

Hubbert’s Curve
Experience has shown that production rates in every oil field reach a peak and then enter into an irreversible decline, even while around half of the original oil remains in the ground. Just as individual fields eventually peak and begin to decline, so do groups of fields and oil-producing regions and nations. This phenomenon was discovered and demonstrated in 1956 by Shell geologist M. King Hubbert, when he correctly predicted that American oil production would peak in the late 1960s or early 1970s. Hubbert illustrated the concept with a bell curve that demonstrates the three phases of oil production—initial increase, peak, and irreversible decline.

Production of conventional crude oil has peaked and is declining in the United States, Mexico, Canada, and Ecuador, all significant sources of oil for California and the United States. England, Norway, and Denmark—representing North Sea production—are also past-peak, along with other significant producers such as Malaysia and Indonesia. A general consensus has developed in the oil

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1Despite a growth in proved reserves since 2001 of 72.9 billion barrels, or approximately six percent, discovery of new oil fields has actually been in decline since the mid-1960s. Much of the reserve growth in the past forty years has consisted of upward adjustments to earlier reserve estimates made possible by the application of new, advanced extraction technologies, and by most accounts the giant oil fields of the world have already been discovered. (Campbell, C. and Laherre, J., “The End of Cheap Oil,” Scientific American, March 1998.)
industry and policy communities that non-OPEC production has peaked or will do so by 2010, despite having an estimated 176 billion barrels of proved reserves remaining in 2006.\textsuperscript{xii}

The rate of global oil production is subject to same pattern of peak and decline, the key difference being that when global production peaks, resources from other regions will not be available to fill the shortfall.

\textbf{Looking Forward—Transportation Fuel Forecasts}

\textbf{Crude Oil and gasoline forecasts}

\textbf{Medium-Term Forecasts to 2015}

In its Medium-Term Oil Market Report, the IEA forecasts a “supply crunch” in the period 2012 to 2015. Production is expected to reach 98 mmbd in 2012, but OPEC spare capacity declines to 1.6 percent of global demand in 2012, from 2.9 percent in 2007. Under this forecast, demand would reach 95.8 mmbd in 2012, a ten percent increase from 2007 and an average annual increase of 2.2 percent.

\textbf{Long-Term Supply Scenarios}

The timing of peak oil is subject to considerable debate. The question of when oil supply will begin to decline is one of tremendous importance, partly because of its impact on mitigation planning strategies of the kind contained in the Regional Energy Strategy. The following passages offer two possible scenarios for oil production to 2030. The outlook for reliable, affordable transportation fuels cannot be known with any precision, but these scenarios will identify areas of uncertainty and provide a foundation upon which transportation fuel policies may be based.

\textbf{A. CONTINUED GROWTH WITH PLATEAU IN GLOBAL OIL PRODUCTION AFTER 2030}

In its International Energy Outlook (IEO), the EIA projects that the supply of liquid fuels will continue to increase unabated to 2030.\textsuperscript{2} Production would reach 118 mmbd in 2030, keeping pace with global demand through the period. Cambridge Energy Research Associates (CERA), a well known energy consulting firm, forecasts supply growth to 130 mmbd by 2030, while the International Energy Agency projects production level of 118 mmbd by that time.

More than two-thirds of new production will come from OPEC nations.

\textsuperscript{2} The IEO definition of liquids refers to all conventional crude oil and energy liquid substitutes (such as ethanol, coal-to-liquids, and gas-to-liquids).
B. PEAK AND DECLINE IN GLOBAL OIL PRODUCTION BEFORE 2030

Total global oil production from existing fields decreases every year. To increase global production, these declines must be offset by new production to stay at the same production level, and additional new production must be added to grow beyond that level. Most estimates of global production decline rates range between four percent and eight percent yearly—approximately equivalent to one or two times the entire annual production of Mexico, the sixth largest global producer. One or two “Mexicos” must be added each year to keep production flat. To increase annual production by 2 mmbd in 2008, as the IEA projects will be necessary to keep pace with demand, the oil industry must add new production equivalent to one to two times the annual production of Iran, the world’s fourth largest producer.

Other reserves estimates with description of OPEC reserves inflation and transparency
Market Interference--Resource Nationalism and Export Withholding
Net Energy, Cost, and Environmental Impacts of Unconventional Fossil Fuels
### Table 1
**Global Peak Oil Production Forecast Dates Ranging to 2030**

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickens, T. Boone</td>
<td>2005</td>
<td>Chairman, BP Capital Management</td>
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<tr>
<td>Deffeyes, K.</td>
<td>2005</td>
<td>Petroleum Geologist (ret.), Shell and professor (ret.), Princeton</td>
</tr>
<tr>
<td>Westervelt, E.T., et. al.</td>
<td>Now</td>
<td>U.S. Army Corps of Engineers</td>
</tr>
<tr>
<td>Simmons, M.</td>
<td>2006</td>
<td>CEO, Simmons and Co. International (oil investment firm)</td>
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<tr>
<td>Baktiari, S.</td>
<td>2006-2007</td>
<td>Planner, Iranian National Oil Company (NIOC)</td>
</tr>
<tr>
<td>Groppe, H.</td>
<td>Very soon</td>
<td>Founder, Groppe, Long &amp; Littel (energy consultants)</td>
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<tr>
<td>Wrobels, S.</td>
<td>By 2010</td>
<td>CEO, Diapason Commodities Management</td>
</tr>
<tr>
<td>Skrebowski, C.</td>
<td>2009-2011</td>
<td>Editor, Petroleum Review</td>
</tr>
<tr>
<td>Ivanhoe, L.F.</td>
<td>Before 2010</td>
<td>Professor (ret.), Colorado School of Mines</td>
</tr>
<tr>
<td>Campbell, C</td>
<td>2010</td>
<td>Petroleum Geologist (ret.), Texaco and Amoco</td>
</tr>
<tr>
<td>Laherrere, J.</td>
<td>2010-2020</td>
<td>Petroleum Geologist (ret.), Total</td>
</tr>
<tr>
<td>Meling, L.M.</td>
<td>2011</td>
<td>Petroleum Geologist, Statoil</td>
</tr>
<tr>
<td>Pang, X., et. al.</td>
<td>Around 2012</td>
<td>China University of Petroleum</td>
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<tr>
<td>Volvo</td>
<td>Before 2015</td>
<td>Automaker</td>
</tr>
<tr>
<td>al Husseini, S.</td>
<td>2015</td>
<td>Executive Vice President of Exploration and Production (ret.), Saudi Aramco</td>
</tr>
<tr>
<td>Merrill Lynch</td>
<td>Around 2015</td>
<td>Financial services firm</td>
</tr>
<tr>
<td>De Margerie, C.</td>
<td>Before 2016</td>
<td>President, Exploration and Production, Total (French oil company)</td>
</tr>
<tr>
<td>West, J.R.</td>
<td>2015-2020</td>
<td>Chairman, PFC Energy (energy consultants)</td>
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<tr>
<td>Mulva, J.</td>
<td>Below 100 mmbd (2015-2025)</td>
<td>CEO, Conoco Phillips (oil company)</td>
</tr>
<tr>
<td>Total</td>
<td>Around 2020</td>
<td>Oil company</td>
</tr>
<tr>
<td>Shell</td>
<td>2025 or later</td>
<td>Oil company</td>
</tr>
</tbody>
</table>
ALTERNATIVE FUELS

Natural Gas

Electricity

Biofuels

Unconventional Fossil Fuels

Hydrogen

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i SANDAG EMFAC run, January 17, 2008.


