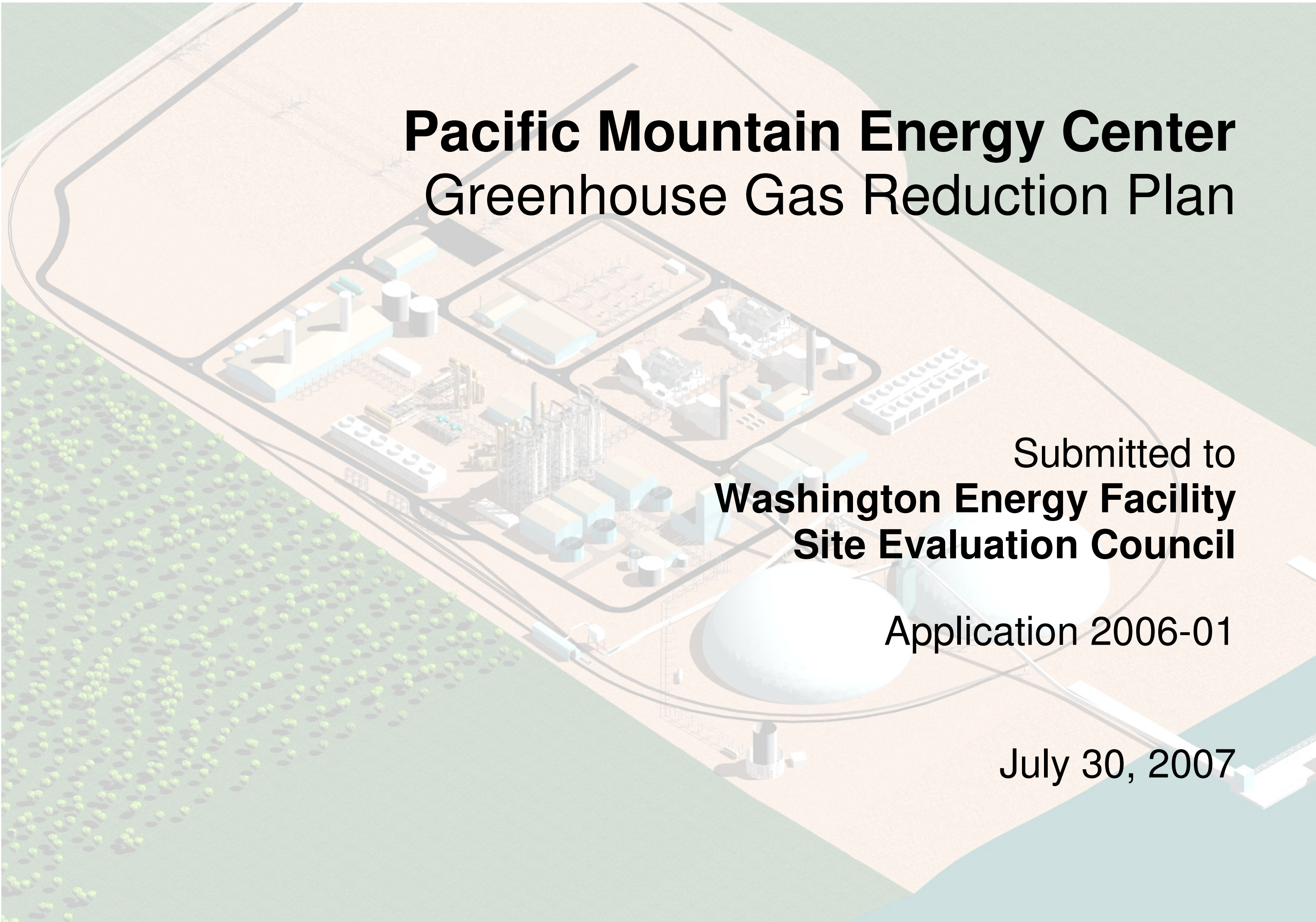

Pacific Mountain Energy Center

Greenhouse Gas Reduction Plan

Submitted to
Washington Energy Facility
Site Evaluation Council

Application 2006-01

July 30, 2007

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I. Summary

Energy Northwest is a joint operating agency (JOA), comprising 20 member public utilities from across the state of Washington. Headquartered in Richland, Washington, Energy Northwest provides electricity, at cost, to public utilities and municipalities. Energy Northwest owns and operates four electricity generating stations: Columbia Generating Station (nuclear power plant), Packwood Lake Hydroelectric Project, Nine Canyon Wind Project, and White Bluffs Solar Station. Energy Northwest also provides operations and maintenance services for other facilities, such as the H.W. Hill Landfill Gas Power Plant in Klickitat County and the Mason County PUD No. 3 Olympic View Generating Facility. To meet the growing needs of its member utilities, Energy Northwest is devoted to the identification and development of new generating resources, encompassing both traditional and advanced technologies.

The proposed Pacific Mountain Energy Center (PMEC) is being developed based on three primary business principles:

- Production of stable, base-load, competitive power
- High proximity to load centers to reduce transmission constraints
- Environmentally advanced with minimum impact

After considering all technology applications, the PMEC business plan was developed utilizing advanced Integrated Gasification Combined Cycle (IGCC) technology. IGCC was determined to be the top technology choice because of its flexibility to transform a variety of abundant feed stocks including petroleum coke, biomass and coal into a clean synthesis gas to run a combined cycle power plant as well as the ability to capture and remove carbon dioxide in a concentrated stream at high pressure. In addition, natural gas could be used to operate the combined cycle plant.

A goal of Energy Northwest is to assist and provide leadership in the development and advancement of greenhouse gas (GHG) reduction solutions. Energy Northwest has been working with regional carbon sequestration partnerships and carbon reduction certifiers for over two years to support and promote GHG reduction. The partnership research applies directly to PMEC's design and its location at the Port of Kalama site, which hosts three geological formations that have been identified as potential candidates for sequestration operations. A significant reason IGCC technology was selected above that of typical coal or even natural gas is the future promise and potential for GHG capture and storage.

The State of Washington recently enacted Engrossed Substitute Senate Bill (ESSB) 6001. It requires new power generation plants that produce over 1,100 pounds of greenhouse gases per megawatt-hour (lb GHG/MWh) to develop a plan with economically and technically feasible sequestration to be implemented within five years of plant operation. In addition, the law provides an additional option for projects currently in the Energy Facility Site Evaluation Council (EFSEC) permitting process to reduce carbon through the purchase of reductions from existing power generation facilities in the western

interconnection, if sequestration implementation is not technologically or economically feasible.

Even before the enactment of ESSB 6001, Energy Northwest had committed to reducing PMEC's GHG emissions, including the primary GHG that will be emitted from PMEC, carbon dioxide ("CO_2"). Energy Northwest proposed PMEC so that this region could be a leader in the industry and set an example that will facilitate IGCC plant construction with a significant CO_2 capture and sequestration component in places where similar geological formations exist and power needs would otherwise be met by direct-fired coal plants, such as China and India. The development design incorporates carbon capture capability and a project layout to accommodate carbon sequestration equipment.

To comply with the ESSB 6001 GHG emissions standard of 1,100 lb GHG/MWh, PMEC will sequester or offset more than 20% of its GHG emissions. Thus, PMEC will meet the requirements of RCW 80.70 through its compliance with ESSB 6001. This plan is submitted in satisfaction of ESSB 6001 and RCW 80.70. PMEC will attempt to meet the ESSB 6001 standard using one or both of two sequestration approaches and, if sequestration is not technologically or economically feasible, will meet it through the purchase of verifiable GHG emission reductions from power generating facilities located within the western interconnection. This plan does not propose any specific on-site or off-site sequestration testing or other specific projects. Any future proposal to implement such projects will comply with the appropriate permitting and environmental review requirements at the time of that proposal.

Energy Northwest is committed to reducing GHG at PMEC and will be in compliance with ESSB 6001 and RCW 80.70. This plan represents the largest GHG reduction proposal in the region and may prove to be a catalyst for others to participate in the global effort. This plan accomplishes this commitment and provides a path to financial certainty for participating utilities through cost effective opportunities for GHG reduction during commercial operations.

I.A Proposed Plan Overview

This Greenhouse Gas Reduction Plan (plan) sets out three parallel paths (geological sequestration, other sequestration and offset purchases) that PMEC will follow to comply with ESSB 6001 and RCW 80.70. Due to the scientific, regulatory and legal uncertainties surrounding sequestration, it may be impossible within the next few years to determine whether geological sequestration will be technologically or economically feasible during PMEC's operating life. Uncertainties also surround other forms of sequestration. With that said, sequestration is clearly Energy Northwest's preferred approach. Moreover, Energy Northwest and project participants must have certainty regarding the costs of meeting its GHG requirements in order to proceed with PMEC development. Accordingly, this plan includes the following components in order to promote the preferred approach while achieving a reasonable degree of cost certainty:

- Plant design that is carbon capture-ready. Anticipated cost: $50 million.

- Conduct an in-depth study[1] of the potential for on-site or near-site geological sequestration (anticipated cost of $10 million) and evaluate other sequestration options.
- On or before commercial operation of PMEC's gasification and generating facilities, submit a report detailing the efforts to achieve sequestration, describing any remaining economic or technical barriers to sequestration, and make a determination of whether sequestration will be technologically or economically feasible within 5 years of such operations.
- If sequestration will not be technologically or economically feasible, Energy Northwest will document how it will meet the performance standard by purchasing verifiable GHG reductions from an electric generating facility located within the western interconnection, where the reduction would not have occurred otherwise or absent this contractual agreement.
- If GHG offsets are purchased to achieve compliance, Energy Northwest will continue to evaluate sequestration opportunities and will sell offsets as appropriate if and when sequestration technology is implemented.

Figure 1 on the following page provides an overall timeline for the evaluation of sequestration technology, and compliance with both RCW 80.70 and ESSB 6001 relative to the construction and operation phases of PMEC.

[1] When the study plan is developed in detail it will be presented to EFSEC for review and a determination of the appropriate permitting and environmental review process.

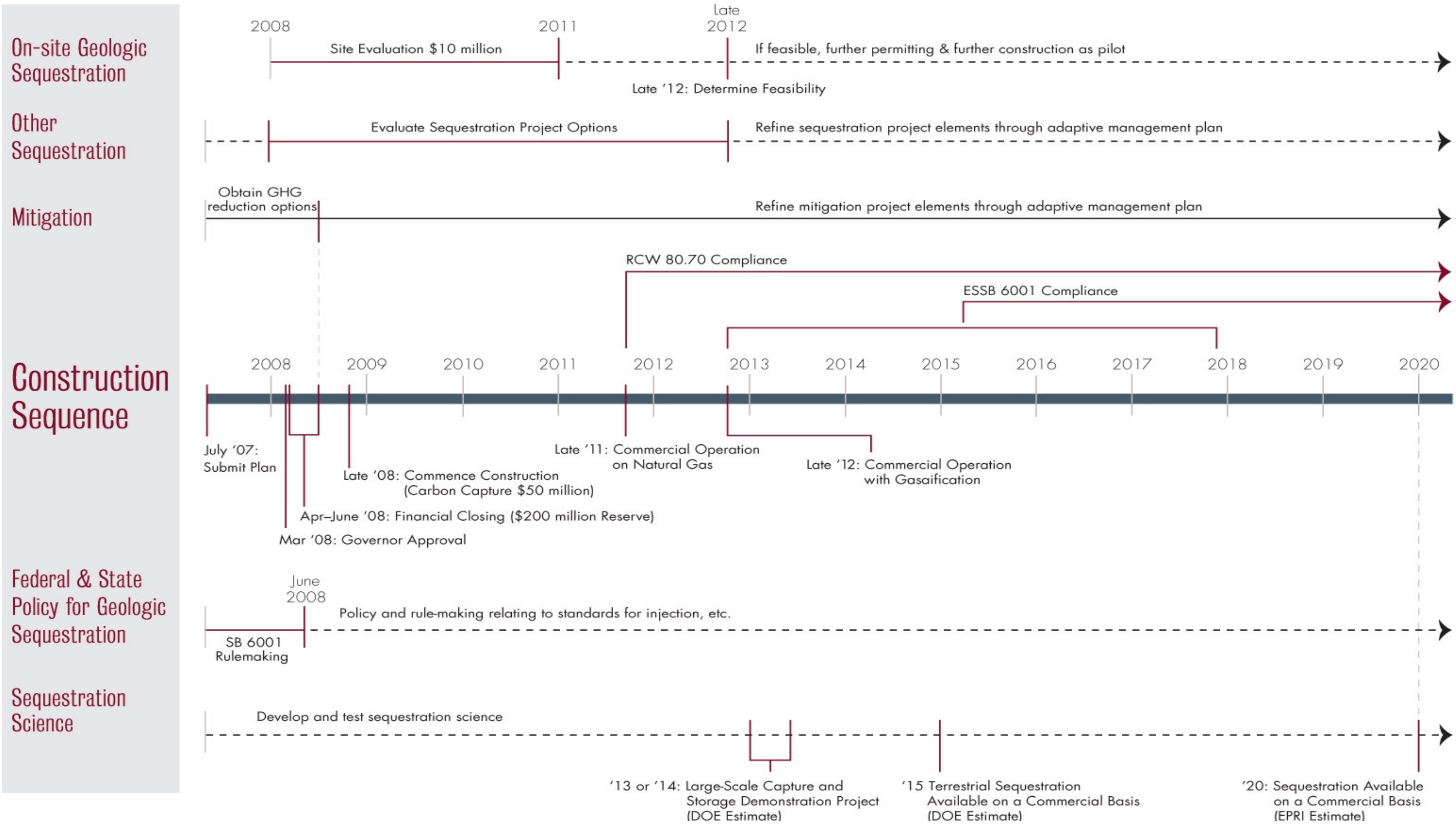

Figure 1. GHG Plan Timeline

II. ESSB 6001 Provisions

Section 5(11) of ESSB 6001 specifies provisions related to the "criteria to be applied in evaluating the carbon sequestration plan" for facilities that propose to sequester GHG after electricity is initially produced at the facility.

(a) Provisions for financial assurances, as a condition of plant operation, sufficient to ensure successful implementation of the carbon sequestration plan, including construction and operation of necessary equipment, and any other significant costs;

> Financial Assurance: During construction approximately $50 million of capital will be spent on PMEC to allow for future CO_2 capture. This will allow approximately 20% of the CO_2 to be captured with minimal future plant modification. In addition, property is reserved and designated for a water shifting expansion to increase capture capability as viable storage is developed. PMEC will include an operational budget for all permanent sequestration applications to be in compliance with state law. Additional financial assurance will be accomplished by meeting the same requirements that would be imposed on a local government owning a facility under EPA's regulations at 40 CFR § 258.74.[2] Finally, a reserve of at least $200 million will be set aside for implementation of sequestration or mitigation as required.

(b) Provisions for geological or other approved sequestration commencing within five years of plant operation, including full and sufficient technical documentation to support the planned sequestration;

> Sequestration: GHG emissions sequestration as specified in this plan will commence within five years of PMEC plant operation. Full and sufficient sequestration documentation under one or more of the above three sequestration approaches will be in place by that time. PMEC will begin to spend up to $10 million over a period of 2-3 years beginning within six months after financial close to geologically characterize potential sites, engineer the PMEC systems and prepare for sequestration.

(c) Provisions for monitoring the effectiveness of the implementation of the sequestration plan;

> Monitoring: Regardless of the option selected, emissions reductions will be verified by an independent third party review from an entity approved by EFSEC to ensure actual GHG emissions reductions and compliance with the law. For sequestration long-term monitoring will be established to ensure permanency in

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[2] Under this regulation, a local government with sufficient bonding capacity and a good credit rating may rely upon its bonding capacity instead of having to establish a trust fund or issue a letter of credit. *See* Federal Register: November 27, 1996 (Volume 61, Number 230)] [Page 60327-60339] for an explanation of why, in the case of a municipal owner, bonding capacity rather than a cash reserve is sufficient to meet this sort of obligation.

accordance with a plan submitted to EFSEC for approval once additional details are known.

(d) Penalties for failure to achieve implementation of the plan on schedule;

Penalties: Failure to implement this plan within five years of plant operation will require PMEC to operate on natural gas or any combination of fuels that result in GHG emissions below 1,100 lb GHG/MWh. This operation will continue until the facility can demonstrate that it meets the emissions standard. In addition, Energy Northwest shall be subject to the enforcement and penalty provisions set out in RCW 80.50.150 for a failure to implement this plan within five years of plant operation.

(e) Provisions for an owner to purchase emissions reductions in the event of the failure of a sequestration plan under subsection (13) of this section; and

See Section V.C.

(f) Provisions for public notice and comment on the carbon sequestration plan.

Public Notice: The review of the plan should be an open and transparent process, but also timely in its execution. Since PMEC is in the middle of the state permitting process, extensive opportunities for public comment are available through EFSEC's Adjudicative Hearings and associated public comment meetings. Energy Northwest requests that EFSEC issue notice of the plan at an appropriate time in the permitting process.

III. Assumptions

The following key assumptions form the basis for this plan:

a. PMEC is anticipated to have an operating life of 30 years. This plan addresses compliance with ESSB 6001 during that operating life. If PMEC operates longer than 30 years, PMEC will submit a supplemental plan to address future compliance if required.

b. ESSB 6001 does not require PMEC to implement GHG reduction projects until five years following plant operation.

c. PMEC will ensure emissions rates from the first five years meet the 1,100 lb GHG/MWh standard by exceeding emissions reduction requirements over the remaining operating life of PMEC.

d. The term "plant operation" means commercial operation of the entire IGCC facility, including the gasification process. Until the gasification process is implemented, the facility would be operating on natural gas and would meet the standard under ESSB 6001.

e. No rulemaking is necessary prior to EFSEC's review and final approval of this plan.

f. The Site Certification Agreement for PMEC will not contain a reopener provision subjecting PMEC to laws imposing additional GHG reduction burdens, except to the extent those laws apply to all electric generating facilities in the State.

g. Any PMEC natural gas power generation delivered for commercial sale before plant operation will be mitigated under RCW 80.70 using the purchase of carbon credits, payments to third parties or applicant controlled reduction projects.

h. Spending $60 million to install carbon capture equipment at PMEC and to characterize the geological sequestration opportunities in the Kalama area represents a good faith effort to implement sequestration for PMEC.

i. The measure of technological and economic feasibility for geological or other permanent sequestration, including carbon capture, compression, transport and storage, is a cost of $5/tonne CO_2 ($240-270 million) inclusive of the $50 million carbon capture investment.

j. To the extent that PMEC's GHG emissions are sequestered or mitigated to comply with ESSB 6001, such sequestration or mitigation will also count in unison toward PMEC's mitigation obligations under RCW 80.70.

k. If renewable fuel sources (such as biomass) become viable feedstocks for PMEC in the future, GHG emissions associated with those renewable fuel sources would be excluded from PMEC's GHG emission rate calculation.

l. PMEC will not be required to meet any GHG emissions performance standard under ESSB 6001 that is more burdensome than 1,100 lb GHG/MWh.

m. If EFSEC approves PMEC's purchase of emissions reductions pursuant to ESSB 5(13), such reductions may be purchased from any permitted electric generating project in the western interconnection. The measure of such a reduction is the difference between emissions at permitted operations prior to and after PMEC's purchase.

n. GHG reductions achieved through efficiency improvements at electric generating facilities located in the western interconnection qualify as GHG reduction projects for purposes of ESSB 5(13).

o. PMEC's emissions performance will be calculated using PMEC's net power output and total GHG emissions. Net power output is determined by taking the maximum continuous electric generating station capacity, less net auxiliary load consumed for electricity production at the electric generating station, under average ambient temperature and barometric pressure conditions.

p. If PMEC obtains GHG reductions associated with sequestration or mitigation in excess of the requirements imposed by ESSB 6001 and RCW 80.70, PMEC may trade or sell such excess reductions or apply them to other GHG compliance requirements.

q. If the costs for geological or other permanent sequestration are above $5/tonne of CO_2, then PMEC will have the option whether to purchase emissions reductions from power plants in the western interconnect or to conduct sequestration in order to meet the 1,100 lb GHG/MWh emissions standard.

IV. PMEC Emissions and Operations

IV.A PMEC GHG Emissions

The following represents the methodology and calculated amount of PMEC GHG emissions reduction to meet the 1,100 pounds of GHG/MWh standard. GHG emissions will vary depending on the fuel source and fuel type used. PMEC generation efficiency can vary substantially due to the configuration of the auxiliary loads. Regardless of the fuel type, the primary GHG from PMEC is CO_2 followed by small amounts of nitrous oxide and methane. Based on preliminary designs PMEC will emit a maximum of 4.8-5.2 million tonnes of CO_2 per year assuming a 100% capacity factor. However, actual emissions are likely to be closer to 4.2-4.6 million tonnes based on a more realistic capacity factor and actual PMEC performance. PMEC nitrous oxide emissions are expected to be less than 60 tonnes per year, while PMEC methane emissions could be as high as 30 tonnes per year, but are expected to be closer to 4 tonnes per year. When converted to CO_2 equivalent using the IPCC Third Assessment global warming potentials the annual emissions are 17,760 tonnes CO_2e and 690 tonnes CO_2e for nitrous oxide and methane respectively. Thus, PMEC GHG emissions are driven almost entirely by CO_2 with very little impact from other GHGs.

Formula for Natural Gas:
Heat rate in MMBtu/MWh (HHV) x 110 Pounds CO_2/MMBtu natural gas (HHV) = Pounds CO_2 emitted per MWh.[3]

Power plant heat rate is calculated by taking the higher heating value (HHV) energy content (MMBtu) of the natural gas entering the combustion turbines and dividing by the net power output (MWh) from the combined cycle power plant during one hour. Net power output is determined by taking the maximum continuous electric generating station capacity, less net auxiliary load consumed for electricity production at the electric generating station, under average ambient temperature and barometric pressure conditions.

Formula for Coal, Petroleum Coke and Other Solid or Liquid Fuels:
When operating on syngas CO_2 emissions are derived from a combination of carbon sources (CO_2, CH_4 and CO). As a result, the CO_2 emissions must accurately reflect PMEC's CO_2 emissions while operating on fuels other than natural gas. Since the gasification process captures some amounts of carbon in the slag, during syngas cleaning or other control systems, the syngas composition just before entering the combustion turbines is used to determine CO_2 emissions.

See Exhibit A for an example calculation of PMEC GHG emissions on syngas. GHG emissions must be converted to pounds and divided by the net power output to yield an appropriate GHG emissions rate for PMEC. Where net power output from the combined

[3] Natural gas to CO_2 conversion factor is derived from EPA's AP-42 Table 3.1-2a, Emission Factors for Criteria Pollutants and Greenhouse Gases from Stationary Gas Turbines.

cycle power plant is determined by taking the maximum continuous electric generating station capacity, less net auxiliary load consumed for electricity production at the electric generating station, under average ambient temperature and barometric pressure conditions.

When available, analytical data (e.g. – vendor supplied analyses) will be used in the above equations to establish estimates. Where analytical data is not available, published emission factors and engineering calculations will be used for estimates.

CO_2 emissions estimates will be trued-up with actual stack emissions numbers from a continuous emission monitoring system. PMEC's total CO_2 emissions expressed in tons will be measured and reported to EFSEC on an annual basis along with net power output.

IV.B Coal and Petroleum Coke Emissions Rate

Once the PMEC baseline GHG emissions per MWh is established on a particular fuel, the differential between the baseline number and the 1,100 lb GHG/MWh standard yields the required emissions reduction for PMEC. When operating on coal or petroleum coke the GHG emissions rate is estimated at 1500 -1700 lb GHG/MWh and estimated at 800 - 900 lb GHG/MWh for natural gas operations. Energy Northwest expects PMEC to operate on natural gas rarely and on other fuels for the majority of the time. As a result, Energy Northwest expects to sequester and/or mitigate 400 - 600 lb GHG/MWh. Updated emissions rates and reductions requirements will be calculated and reported when fuel supplies and plant design are more refined in accordance with the requirements of section VI. Continuous emissions monitoring will be used to verify actual PMEC GHG emissions. Overall, Energy Northwest estimates that achieving the ESSB 6001 standard will prevent approximately 1.6-1.8 million tonnes of GHG from entering the atmosphere each year over the operating life of PMEC.

IV.C PMEC Emissions Reductions

PMEC will continue to evaluate fuel specifications and equipment design and modifications to increase efficiency and reduce GHG emissions. Plant configuration may be modified during the final design and construction to optimize processes, increase net power output and minimize GHG emissions.

Biomass Fuel Utilization:
While Energy Northwest is not proposing to operate PMEC with renewable fuels, in the future, the ability of PMEC to operate on a variety of fuels can help reduce GHG emissions per MWh. Under ESSB 6001, electric generation facilities powered exclusively by renewables are deemed in compliance with the GHG emissions performance standard. PMEC has the ability to use a small amount of renewable fuels (potentially 10%) such as biomass or byproducts of pulping or wood manufacturing processes readily available in Cowlitz County. Since these fuels are carbon neutral, the use of these fuels would reduce the GHG emissions on a prorated energy basis, consistent with their percentage blend in the PMEC fuel. For example, if 10% of PMEC fuel usage is biomass then the GHG emissions from PMEC would be reduced by 10%. Prior to

operating PMEC on renewable fuels, Energy Northwest would seek the appropriate amendments to PMEC's Site Certification Agreement and the associated permits.

Natural Gas & Syngas Blending:
Another alternative for PMEC to reduce GHG emissions is the ability to run directly on natural gas or blend different amounts of natural gas and syngas. Blending lower carbon fuels with higher carbon fuels can reduce the pounds of CO_2 emitted per MWh. By blending some lower GHG emissions natural gas with the higher GHG emissions syngas the overall emissions rate of GHG/MWh decreases. PMEC emissions are expected to be below the 1,100 lb GHG/MWh standard when operating on natural gas. Thus, operations with any amount of natural gas will correspondingly reduce the requirement for GHG emissions reductions from ESSB 6001 for PMEC.

It is likely that PMEC will be constructed in phases with the first phase operating exclusively on natural gas. During this period PMEC will not be required to reduce GHG emissions under ESSB 6001 because the plant GHG emissions will be below the 1,100 lb GHG/MWh standard. However, PMEC would still meet the requirements of RCW 80.70 under this scenario.

PMEC Efficiency Improvements:
Estimates for PMEC power plant efficiency have been conservative and future efficiency improvements are likely over the life of the project. For every two percent of efficiency improvements at PMEC, GHG emissions will be reduced by approximately five percent. Efficiency improvements are a potential key to reduce GHG emissions as they would directly apply to meeting the 1,100 lb GHG/MWh standard for PMEC. Overall PMEC efficiency improvements can result from reduction of auxiliary loads related to electricity generation, use of more efficient fuels, preconditioning fuels, process improvement, or increased use of waste heat.

V. Sequestration and Mitigation Opportunities

Due to the uncertainty and early scientific state of GHG sequestration research, it is most likely that the most feasible method to comply with ESSB 6001 will initially be to use a combination of sequestration/mitigation options to reach the emission standard. For example, some geological sequestration, some permanent sequestration, some design and fuel balance modifications, and some purchases of emission reductions from other power plants located in the western interconnection may be required to meet the emissions standard.

The first and preferred approach is to achieve GHG reduction using geological sequestration. Geological sequestration is being extensively researched by the US Department of Energy (DOE) via seven regional partnerships. Energy Northwest is an active member of one of these partnerships, the Big Sky Carbon Sequestration Partnership (Big Sky). Though geological sequestration looks promising, it is still in the early stages of research and development with many questions to be resolved before commercial-scale application is possible for PMEC. However, representatives of Big Sky believe that many of these questions could be answered early enough to support a small test injection before PMEC begins plant operation. At this point, the extensive deployment of IGCC technology is critical to advance sequestration research. IGCC is the first step in advancing the ability to sequester and store carbon through its ability to capture and separate CO_2 prior to combustion. Major sequestration challenges revolve around the geological interfaces and liabilities, regulatory policies and requirements, technical designs and overall economic costs and risks. CO_2 is currently a highly valued commodity for enhanced oil recovery (EOR), enhanced gas recovery and enhanced coal bed methane gas production. Its value, however, is limited by the current lack of infrastructure to deliver the CO_2 for use in these markets. IGCC is the enabling technology to carbon sequestration as it has proven ability to provide the GHG streams that are required to promote and further advance large scale sequestration science and commercial applications.

Energy Northwest has already begun its approach on geological sequestration by designing PMEC to be capture-ready and by working with scientists and regional stakeholders to study and enable the commercialization of geological sequestration through PMEC. Energy Northwest will pursue geological sequestration in accordance with the provisions set out in Section V.A below. Energy Northwest cannot achieve geological sequestration on its own; strong support from federal and state agencies and regional stakeholders will be required to make it a viable solution to reduce growing concentrations of GHG in our atmosphere. In addition, for GHG capture and storage, federal and state permitting regulations and associated public policies must be developed.

PMEC will implement geological sequestration when and if the technology of geological storage applications is proven viable, regulatory policies are developed to support it, and the economics are competitive with other GHG reduction alternatives. We are optimistic and believe that the economic viability of geological sequestration will greatly increase over time with the establishment of a comprehensive GHG emissions trading program or cap and trade system that involves a large number of emitters and with advancements in technology. Expanding GHG credit trading should be a priority and alternative methods to reduce GHG emissions should be encouraged.

The second sequestration approach is to develop other permanent sequestration alternatives to reduce GHG emissions. Permanent GHG emissions reductions can be accomplished in a variety of ways, including sequestration alternatives involving forestry, agricultural or other certified projects. These GHG emissions reduction projects would be monitored and verified by an independent third party to ensure actual GHG reductions.

If implementation of either the first or second options is not feasible due to technological and/or economic barriers then the third approach will be implemented. The third approach requires the purchasing of verifiable GHG emissions reductions from power plants in the western interconnection. Purchased GHG emissions reductions could take on a wide variety of forms, but would likely involve operational restrictions or efficiency improvements in one or more of the approximate 1,000 potential western generating facilities.

V.A Geological Sequestration

At this time, geological sequestration is not technically or economically feasible for PMEC's expected CO_2 emissions. Conducting injection and long-term storage operations in geological reservoirs, particularly in the face of uncertain carbon management requirements, will require resolution of a host of challenging legal, regulatory, policy, financial and technical issues. However, Energy Northwest believes that geological sequestration will provide technologically or economically feasible GHG emission sequestration opportunities sometime during PMEC's operating life. For this reason, Energy Northwest proposes to invest $50 million to install GHG capture technology and $10 million to characterize the geological formations associated with the Kalama area and determine whether geological sequestration is technologically or economically feasible there. These investments, along with the adaptive management provisions set forth in Section VI, represent Energy Northwest's good faith efforts to implement sequestration as required by ESSB 6001.

Energy Northwest is also working with DOE programs under the Big Sky, the West Coast Regional Carbon Sequestration Partnership (WestCarb) and the DOE's National Energy Technology Laboratory (NETL). The DOE is the leader of clean coal and sequestration methods and technologies with help from other stakeholders. The geological sequestration concepts will be proved up through the FutureGen program[4] and demonstration sequestration projects from the regional partnerships. Although progress is being made with promising results, the earliest schedule for initial federal sequestration demonstration projects is in the 2013 to 2014 time fame. Energy Northwest is diligently working with federal agencies to support geological sequestration for PMEC.

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[4] FutureGen is a DOE initiative to build the world's first integrated sequestration and hydrogen production research power plant. The $1 billion dollar project is intended to create the world's first zero-emissions fossil fuel plant.

Potentially, PMEC could become one of the DOE commercial scale demonstration projects. In addition, if geological sequestration at the Kalama site is not feasible, PMEC might transport the CO_2 to a more suitable site. Commercial applications of geological sequestration would come after the initial test projects. The Electric Power Research Institute (EPRI) estimates that commercial sequestration applications will be available in the year 2020. Until then, large scale geological sequestration for PMEC is unlikely to be technically or economically feasible and alternative GHG reduction strategies will need to be implemented for PMEC.

PMEC Carbon Capture and Storage (CCS) Process:
In order to facilitate future carbon sequestration, PMEC will be designed to be CO_2 capture ready. This would be accomplished by installing a Selexol® or equivalent process that allows bulk CO_2 removal with a potential to provide approximately 20% CO_2 capture, depending on the fuel characteristics. The PMEC facility design concept also includes the appropriate connection points, piping and vessel sizing and equipment location areas as well as production capacity for the later addition of equipment needed to capture and compress most of the pre-combustion CO_2 produced by PMEC. The estimated cost of this design is approximately $50 million.

Current Technological and Economic Feasibility of Geological Sequestration:
Geological sequestration of CO_2 in a geological formation requires the injection of CO_2 into an underground formation that has the capability to contain it securely over a long period of time. Figure 2 is an example CO_2 storage project life cycle showing the importance of integrating site characterization with a range of regulatory, monitoring, economic, risk and engineering issues.

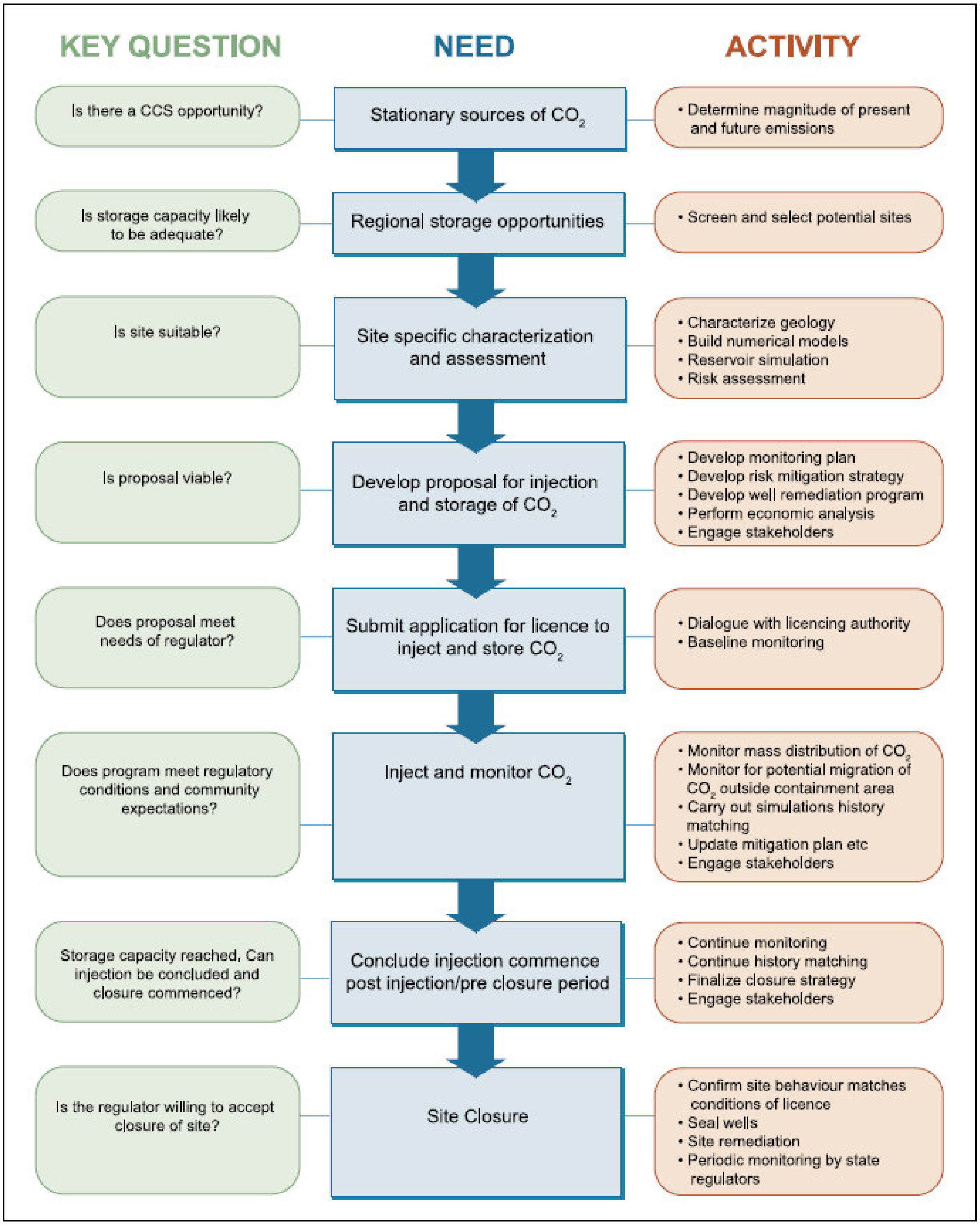


Figure 2: Geological Sequestration Project Life Cycle (Source: IPCC Special Report on CCS)

To address the importance of geographical diversity in addressing carbon management issues, DOE is funding seven Regional Carbon Sequestration Partnerships (RCSPs) that coordinate research, development, deployment, and outreach in a particular region of the country. These RCSPs will define and implement the technology, infrastructure, standards, and regulations necessary to promote CO_2 sequestration in their respective Regions. For the PMEC there are two overlapping RCSPs: the Big Sky and Westcarb.

The unique geology of the Kalama area contains three potential formations for CO_2 injection: deep unmineable coal seams, deep saline aquifers and basalt formations. Deep saline aquifers are a target formation for examination by both Big Sky and Westcarb, while unmineable coal deposits are a focus area for Westcarb and basalts are covered by Big Sky. Having overlapping storage formations and the presence of underground natural gas storage enhances the potential for underground CO_2 storage in the Kalama area. See Figure 3 Project Location.

Figure 3: Project Location

Unmineable coal seams are too deep or too thin to be economically mined. All coals have varying amounts of methane adsorbed onto pore surfaces, and wells can be drilled into unmineable coalbeds to recover this coalbed methane (CBM). Cascadia Energy, a subsidiary of publicly traded Torrent Energy, is beginning a drilling program for CBM development in the Chehalis coal basin just north of the Kalama site. Standard CBM recovery methods, such as dewatering and depressurization, leave a considerable amount of methane in the formation. Additional recovery can be achieved by sweeping the coalbed with CO_2 which is preferentially absorbed by the coal. Depending on coal rank three to thirteen molecules of CO_2 are adsorbed for each molecule of methane released, thereby providing an excellent long-term storage site for CO_2 along with the additional benefit of enhanced coalbed methane (ECBM) recovery. Carbon dioxide-ECBM has the potential to increase the amount of produced methane to nearly 90% of the gas, compared to conventional recovery of only 50% by reservoir-pressure depletion alone. Similar to maturing oil reservoirs, unmineable coalbeds are good candidates for CO_2 storage. Research is focused on maintaining CO_2 injectivity as the coal absorbs CO_2 and swells. Technical feasibility depends on the permeability of the coal bed. Figure 4 shows the location of coal deposits in Washington.

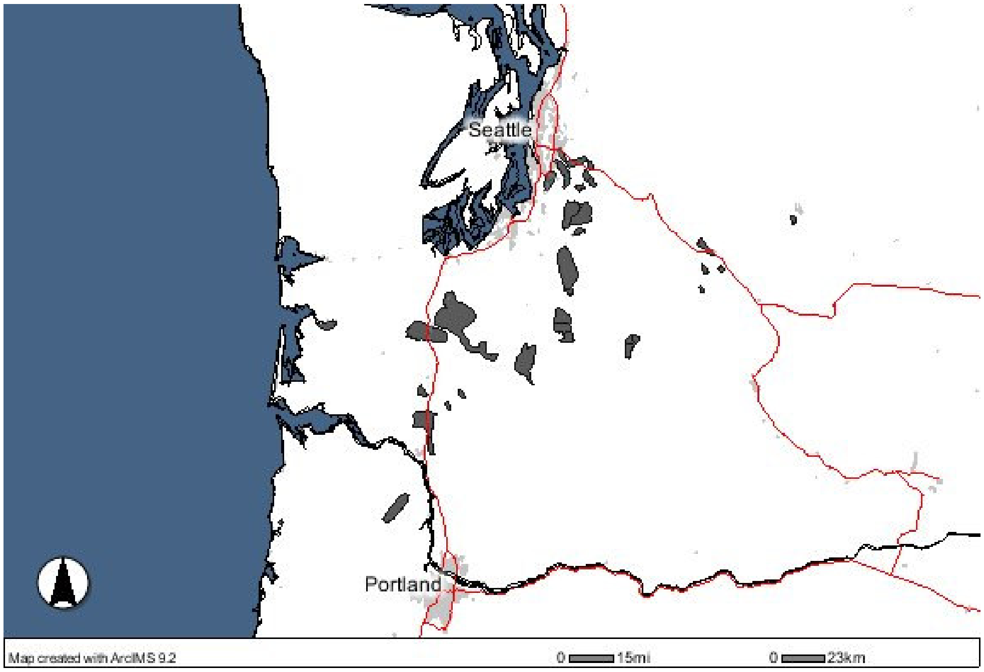
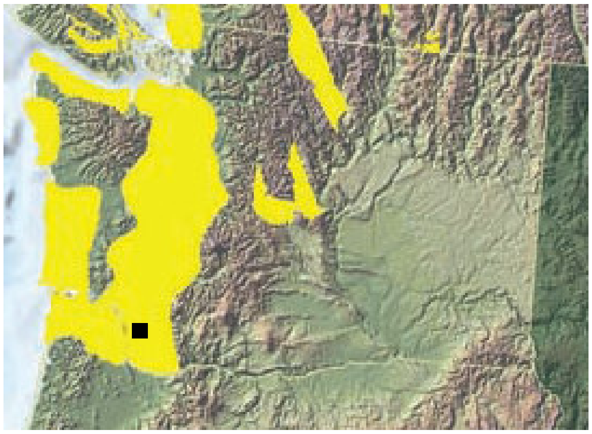


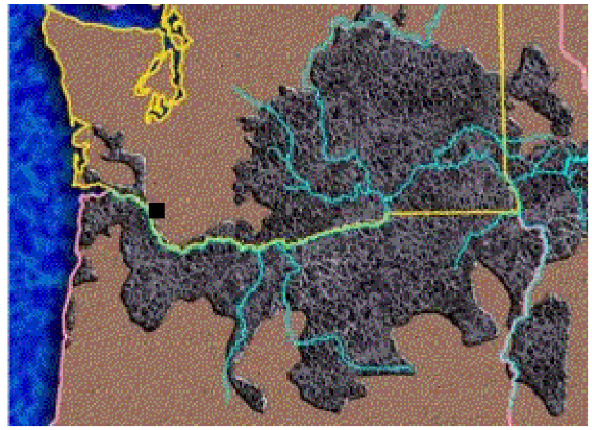
Figure 4: Washington Coal Deposits

Saline formations are deep sedimentary rocks saturated with formation waters or brines containing high concentrations of dissolved salts. These formations are widespread and contain enormous quantities of water, but are unsuitable for agriculture or human consumption. Ideally these formations are overlain by one or more impermeable rock layers and thus have the potential to trap injected CO_2. They are much more extensive than coal seams in the Kalama area, and represent an enormous potential for CO_2 storage. The advantages of saline formations include a large aggregate CO_2 storage capacity and a low number of existing well penetrations compared to oil and gas formations. However, saline formations are less well known because they lack the characterization experience that industry has acquired through resource recovery from oil and gas reservoirs and coal seams. Therefore, there is a greater amount of uncertainty regarding the suitability of saline formations for CO_2 storage. Sequestration investigation activities over the next few years should greatly increase the level of understanding regarding sequestration in saline formations.

Basalts are geological formations of solidified lava. Basalt formations have a unique chemical makeup that could potentially convert all of the injected CO_2 to a solid mineral form (carbonates), thus isolating it from the atmosphere permanently. The basalt formations in Washington have relatively high porosity and permeability compared to most. Research is focused on enhancing and harnessing the mineralization reaction and increasing CO_2 flow within a basalt formation. Flows and layered intrusions of basalt occur throughout the Columbia River Basin. Figure 5 shows the location of saline and basalt formations in Washington.



Deep saline formations in the WA area
Source: NATCARB



Extent of the Columbia river basalts
Source: USGS

Figure 5: Washington Saline and Basalt Formations

The DOE expects to implement field tests to validate the efficacy of carbon sequestration technologies in a variety of geological and terrestrial sinks and to have pilot-scale unit operation performance results from a combination of CO_2 capture, monitoring and verification, and storage system components by 2014. These pilots will involve site-specific focus for:

- Testing capture, transport and storage technologies
- Assessing capacities and characterization of various geological formations
- Defining costs
- Assessing leakage and permanence rates
- Providing input for policy analysis
- Validating monitoring, mitigation and verification procedures
- Testing regulatory requirements
- Identifying sites for capacity-building in area of carbon management

Accounting for the lag associated with pre-large-scale validation and design and construction of large-scale systems, large-scale commercial units are expected to come on-line around 2020. As a result, geological sequestration is not technologically or economically feasible for PMEC's expected CO_2 emissions at this time, although Energy Northwest expects it to be technologically or economically feasible within PMEC's operating life time.

<u>*PMEC Site Characteristics:*</u>
Energy Northwest has a written agreement with Big Sky to conduct a very high level characterization of the PMEC site from existing data. To enhance the Big Sky effort Energy Northwest will spend up to $10 Million to establish feasibility of carbon storage in the Kalama area in a phased process. This amount is in alignment with budget estimates established by DOE for site characterization efforts. Energy Northwest, with help from Big Sky, may apply for a grant under the Clean Coal Power Initiative or other funds from DOE to conduct additional testing of new capture and sequestration technologies.

The evaluation of the Kalama site's overall suitability for geological sequestration will follow a three step process. An initial study with Big Sky summarizing existing knowledge and data will be conducted as a first step. This should be completed in 2008[5]. As a second step, a broad geophysical survey of the region would build on the initial study and utilize a variety of methods to obtain more detail and can be expected in 2009. This second step survey will probably include a combination of aeromagnetic, gravimetric, 2-D and 3-D reflection seismic surveys, and would identify the thickness of viable strata, the structure of primary storage units, and the location of potential geological hazards (e.g. large faults). In a third step utilizing the results of the survey, detailed data could be obtained for the most promising reservoirs using seismic methods (to reveal the spatial and geographical characteristics) or through drilling wells (to reveal the porosity, injectivity and geochemistry of the formations). The detailed data collection would likely be complete sometime in 2011. Throughout the evaluation period, Energy Northwest will examine the results of DOE sequestration progress, especially the Big Sky basalt characterization test and the large volume deep saline test to determine the applicability to analogous geologic sites in proximity to PMEC.

V.B Other Permanent Sequestration

SB 6001 also allows PMEC to use other, permanent sequestration options approved by Ecology to meet its emission standard. However, just as with geological sequestration, other permanent sequestration of the PMEC emissions necessary to meet the emissions standard is not technologically or economically feasible at this time. Energy Northwest is hopeful that continued research and development of sequestration alternatives will continue over time and result in feasible options to eliminate GHG emissions. Some potential options for permanent sequestration are listed below. If the sequestration options below or other sequestration options become technologically or economically feasible in the future, PMEC will submit them for approval through the process set out in Section VI below. Due to the fact that CO_2 is a global issue, other permanent sequestration projects could be proposed to be located worldwide. Energy Northwest will partner with entities, such as The Climate Trust, to solicit, evaluate and purchase the requisite number of greenhouse gas offsets according to the requirements of the laws and required project quality criteria. Some examples of permanent sequestration follow below. The examples are not an exhaustive list of all available forms, but they are representative of options that will be evaluated.

Forestry Emission Reduction Projects:

Forest projects include aforestation and forest enrichment, combined forestation and forest conservation projects, and urban tree planting. Aforestation and forest enrichment projects occur on un-forested or degraded forest land. Forest conservation projects are eligible if they are undertaken in conjunction with forestation on a contiguous site. Emissions reductions are quantified on the basis of avoided deforestation rates specified for geographic regions. Forest owners need to provide evidence that enhanced management practices take place as a result of the mitigation funding and that all their forest holdings are sustainably managed as demonstrated in the form of certification from

[5] When the site characteristics study plan is developed in detail it will be presented to EFSEC for review and a determination of the appropriate permitting and environmental review process.

a third-party verification program. In addition, the project owners must demonstrate that they sustainably manage their non-project forest carbon stocks, and that their non-project forest holding are not converted to non-forest uses. Carbon accumulation in aforestation projects is quantified through direct measurement or properly parameterized growth models. To account for any net losses in forest carbon stocks, a percentage of emissions reductions of all forest emissions reductions generated by eligible forestry projects will be held in a forest carbon reserve pool. Annual GHG emission reductions in the reserve pool shall be released to project owners at the end of the project crediting period. Options for demonstrating this include establishment of long-term conservation easements for forest maintenance, legal protection through transfer of ownership to recognized conservation entities.

Agricultural Emission Reduction Projects:
Soil carbon sequestration. Eligible projects include: continuous no-till, strip-till, or ridge-till cropping, grass planting, and tree planting. GHG emissions reductions issued for eligible projects will be determined at an applicable rate in metric tons CO_2 per acre per year. All agricultural projects would be subject to independent third-party verification.

Methane Capture and Destruction Projects:
Landfill methane emission reductions are issued to owners of GHG emission reductions achieved by landfill methane collection and combustion systems. Eligible landfills are those not already required to collect methane under any state, local, regional or national law. Agricultural methane emission reductions are issued to owners of GHG emission reductions achieved by agricultural methane collection and combustion systems. Eligible agricultural methane collection/combustion systems include covered anaerobic digesters, complete-mix and plug-flow digesters, among others. Methane collection projects that include electricity generation may also qualify for additional GHG emissions reductions based on displaced emissions provided that the GHG attributes of the project have not been sold along with the gas or power. Clear ownership rights of the emission reductions from the destruction of methane must be demonstrated. Methane emissions reductions are issued on the basis of all methane collected and destroyed. At least once per year, gas flow measurements, records and procedures must be verified by an approved verifier in accordance with established protocols. Approved verifiers provide independent third party review of project reports, maintenance of project activity, and attest to the accuracy of the data.

Investing in Geological Sequestration at Another Site:
As the applications of geological sequestration moves ahead, opportunities for participation in geological sequestration projects at sites around the world may exist. PMEC could participate by investing equity into these projects and would acquire a proportionate share of the project's permanent GHG emissions reductions. Project GHG reductions would in turn reduce PMECs GHG emissions. An example opportunity would be to allow PMEC to participate in any of the commercial geological sequestration projects proposed by DOE RCSPs.

V.C Purchasing Verifiable GHG Emission Reductions

Energy Northwest is proposing to build PMEC with equipment that will allow capture GHG emissions for purposes of sequestration. However, because sequestration is not expected to be feasible due to economic and/or technical barriers over the five years following plant operation, PMEC expects to initially implement the purchase of verifiable GHG emissions from power plants in the western interconnection in order to meet the standard of 1,100 lbs GHG/MWh. The western interconnection is defined as the interconnected electrical systems located in the Western Electricity Coordinating Council (WECC) region, which extends from Canada to Mexico. The region includes the provinces of Alberta and British Columbia, the northern portion of Baja California, and all or some of fourteen western states. Currently there is a potential pool of nearly 1,000 coal, oil, natural gas or other non-renewable GHG emitting generation facilities operating or permitted in the western interconnection that may be available for the purchase of offsets. Energy Northwest has entered into an agreement with The Climate Trust under which The Climate Trust will provide technical assistance and guidance in selecting appropriate GHG sequestration and/or reduction projects.

Purchased Emissions Reductions from Operations Restrictions:
The measure of a reduction associated with a new restrictive limit on power plant operations is the difference between emissions at permitted operations prior to and after PMEC's purchase. Emissions reductions from western interconnection power plants can be contracted for on a monthly basis and converted to an annual emission rate reduction for PMEC. Purchased emissions reductions can come from one or more generation facilities. The reductions purchases must come from operating restrictions or efficiency improvements that have not been publicly announced or internally funded before PMEC has negotiated the purchase agreement.

Baseline emissions for a target power plant are calculated using AP-42, Compilation of Air Pollutant Emission Factors found in WAC 173-407-050 (lb/MMBtu) multiplied by the maximum design fuel firing rate (MMBtu/hour) and multiplied by the period of time (hours). Maximum design fuel firing rate is calculated by multiplying the plant's higher heating value heat rate (MMBtu/MWh) by the net generation capability (MW).

After baseline emissions are determined, PMEC's share of the GHG emissions are calculated by multiplying the baseline emissions by the capacity fraction (purchased capacity reduction divided by total capacity). Finally, the pounds of GHG can be converted to PMEC emissions rate by dividing by the PMEC annual generation (MWh).

For example:
PMEC purchases a 100 MW GHG emissions reduction from a 1,000 MW sub-bituminous coal power plant with a heat rate of 10 MMBtu/MWh for a period of April through June. The baseline emissions for this plant are 10 MMBtu/MWh x 1,000 MW x 282.94 lb/MMBtu x 2184 hours = 6.18 billion lb GHG. PMEC's share of the baseline emissions are 100MW/1,000MW = 10% or 618 million lb GHG. Assuming PMEC produces 6 million MWh for the year, this yields a 102.7 lb GHG/MWh reduction in PMEC's annual emissions rate.

Purchased Emissions Reductions from Efficiency Improvements:
GHG reductions achieved through efficiency improvements at electric generating facilities located in the western interconnection are calculated in a similar way to operating restrictions. First, baseline emissions for the plant are calculated before the change in efficiency. Second, the new heat rate is determined from the process improvement (i.e. the numerator is reduced because less fuel is required for the same electrical output, the denominator is increased because more electrical output is provided for the same amount of fuel or a combination of both mechanisms).

The percentage change in heat rate from before and after the efficiency improvement is determined and multiplied by the facility baseline emissions to determine the change in emissions for the facility. Finally, the amount of GHG in pounds can be converted to PMEC emissions rate by dividing by the PMEC annual generation (MWh).

Continuing with the above example assumptions, the baseline emissions for the facility are 6.18 billion lb GHG. Efficiency improvements reduce the heat rate from 10 MMBtu/MWh to 9 MMBtu/MWh, a change of 10% or 618 million lb GHG. Assuming PMEC produces 6 million MWh for the year, this yields a 102.7 lb GHG/MWh reduction in PMEC's annual emissions rate.

Repowering an old power generation facility would work in a similar manner as an efficiency improvement, but require more complex calculations.

Development of Renewable Energy Resources:
Development of new renewable generation resources displaces GHG emissions based on the CO_2 emissions associated with natural gas based electricity production. Location of the renewable energy project must be in the western interconnection. GHG emission reductions can be earned from renewable energy systems such as wind, solar, hydropower, geothermal, and biomass. The renewable generation project must be announced after the effective date of this plan with the intent of supplying the carbon reductions to PMEC.

PMEC must demonstrate clear ownership rights to the environmental attributes associated with the renewable energy production. Eligible renewable energy and associated environmental attributes are those not being used to meet obligations established by state or local mandates (e.g., renewable portfolio standards). The energy generated by the renewable energy system will not be sold as "green" to other entities. To prevent double counting of benefits, any renewable energy credits (RECs) generated by qualifying systems must be surrendered and retired in order for emissions reductions to be issued. A third-party verifier will confirm project eligibility, ownership of environmental attributes and ongoing project performance. For new renewable energy systems that displace electricity, GHG emission reductions are issued at a rate of 1,100 pounds of CO_2 per megawatt hour, the emission rate of a typical gas combined cycle power plant.

VI. Plan Compliance Program

VI.A Reporting Requirements

Energy Northwest will provide an initial report and subsequent periodic reports to EFSEC as follows. The information in the reports will be verified by an independent expert proposed by Energy Northwest and approved by EFSEC.

Initial Report:
Prior to plant operation, Energy Northwest will provide a report containing the following information:

- Estimates of PMEC's annual GHG emissions based on PMEC's design specifications.
- Updated evaluation of the technological and economic feasibility of geological sequestration and other permanent sequestration.
- A plan for the transition to geological and other permanent sequestration for PMEC GHG emissions within the following five-year period, if there is a determination that geological and other permanent sequestration is technically and economically feasible, as defined by this plan.
- Proposals for sequestration and mitigation projects necessary to comply with RCW 80.70 for the first five years following plant operation.

Periodic Reports:
Following plant operation, Energy Northwest will provide an annual report containing the following information to EFSEC:

- PMEC's actual GHG emissions in the previous year as measured by PMEC's continuous emission monitoring system.
- Progress reports for EFSEC-approved sequestration and mitigation projects.
- Certification of PMEC's compliance with the mitigation requirements of RCW 80.70 and with the emissions standard of ESSB 6001 for the previous year.

Following plant operation, Energy Northwest will provide a report containing the following additional information to EFSEC every 5 years:

- Financial report of sequestration and mitigation expenditures and obligations.
- Updated evaluation of the technical and economic feasibility of geological sequestration and other permanent sequestration.
- A plan for the transition to geological sequestration or other permanent sequestration for PMEC GHG emissions within the following five-year period, if there is a determination that geological sequestration is technically and economically feasible, as defined by this plan.
- Proposals for sequestration and mitigation projects necessary to comply with RCW 80.70 and ESSB 6001 for the following five years.

VI.B Proposals for Sequestration and Mitigation Projects

Energy Northwest's proposals for sequestration and mitigation projects will include the following information:

- Description of the project, including its location, cost and schedule.
- Detailed information regarding the nature of the expected GHG reductions associated with the proposed project, including a calculation of carbon sequestration or offset and measures designed to ensure additionality and to prevent leakage.
- Description of the contractual commitments that ensure that PMEC obtains and retains clear title to the sequestration or offsets for the life of the project.
- Description of the proposed management for the project, including project-related administrative work, contracts and inspections necessary to complete the project.
- Demonstration that the GHG reductions associated with the project will not occur absent Energy Northwest's involvement in the project.
- Proposed GHG reduction measurement and verification plan; provided, however, that EFSEC will not use the results of such a plan to make any retrospective adjustment in the amount of GHG reductions associated with the project.
- Validation by an independent expert approved by EFSEC.

VI.C Sequestration/Mitigation Project Approval

Following EFSEC's receipt of a proposal as described in Section VI.B above, EFSEC, in cooperation with Ecology as necessary, will evaluate Energy Northwest's proposed sequestration and mitigation project for compliance with ESSB 6001, RCW 80.70 and this plan. EFSEC approval or denial of an Energy Northwest-proposed project will be provided within four months of its receipt of such request.

VII. Retroactivity and Preemption

VII.A Retroactive Review

There will be no retroactive review of sequestration or mitigation projects, except to ensure that expenditures were in fact made as approved by EFSEC.

VII.B Preemption and Sunset

If a new state or federal law preempts this plan, to the extent that any carbon sequestration or mitigation obligation under this plan has not been met at the time of such change in law, Energy Northwest may meet such obligation through compliance with the new program, and further obligations under this Plan will end.

Exhibit A

Example GHG Emissions for Syngas Operations

	A	B	C	D	E	F	G	H
Clean Syngas	Syngas Composition (Volume %) [1]	Molecular Weight (lb/lb-mol)	Volume % * Molecular Weight (A*B)	Syngas Composition (Weight%) (C/Total C*100)	Molecular Carbon% (12/B*100) [2]	Syngas Carbon Weight% Sum(D*E)/(100) [3]	Energy Content (Btu/scf)	Syngas Energy Content (Btu/scf HHV) (A*G)
H2	22.0%	2	0.44	2.08	0.00	0.00	324	71.28
CO	45.0%	28	12.60	59.49	42.86	25.50	321	144.45
CH4	2.0%	16	0.32	1.51	75.00	1.13	1010	20.20
CO2	7.0%	44	3.08	14.54	27.27	3.97	0	0.00
N2	2.0%	28	0.56	2.64	0.00	0.00	0	0.00
Ar	1.0%	40	0.40	1.89	0.00	0.00	0	0.00
H2O	21.0%	18	3.78	17.85	0.00	0.00	0	0.00
Total	**100.0%**		**21.18**	100.00		**30.59**		**235.93**

AP42 Table 3.1-2a - Stationary Gas Turbines

	lb/MMBtu	tonne/ MMBtu
N2O	3.00E-03	1.36E-06
CH4	8.60E-03	3.90E-06
CO2	110	4.99E-02

Source: EPA

Global Warming Potential

GHG pollutant	GWP
CO2	1
CH4	23
N2O	296

Source: IPCC's Third Assessment Report (2001)

Notes:

1 - volumetirc fraction or volumetric percentage is the same as the mole fraction for gases

2 - Example: (12 lb C / 1 lb-mole C)*(1 lb-mole C / 1lb-mole CO)*(1 lb-mole CO / 28 lb CO)*100% = 42.86

3 - The carbon content of the fuel mixture is a weighted average of the individual fuel component carbon contents.

Example: (1/100)*((2.08*0)+(59.49*42.86)+(1.51*75.00)*(14.54*27.27)+(2.64*0)+(1.89*0)+(17.85*0))=30.59 Wt% C

GHG Emissions Calculation (annual)

Source	FUEL TYPE	FUEL USAGE		ANNUAL OPERATION HOURS	CO_2			CH_4			N_2O			TOTAL CO2 Equivalent Emissions (tonne/yr) [1]
		RATE	UNIT		EF[2]	EF UNIT	Emissions (tonne/yr)	EF[2]	EF UNIT	EMISSIONS (tonne/yr)	EF	EF UNIT	EMISSIONS (tonne/yr)	
Combined Cycle Plant	syngas	4852	MMBtu/hr (HHV)	8760	1.21E-01	tonnes/MMBtu (HHV)	5,122,009	9.75E-08	tonnes/MMBtu (HHV)	4.1	1.36E-06	tonnes/MMBtu (HHV)	57.8	5,139,222
Tank Vent Oxidizer	syngas	15	MMBtu/hr (HHV)	8760	1.21E-01	tonnes/MMBtu (HHV)	15,835	9.75E-08	tonnes/MMBtu (HHV)	0.0	1.36E-06	tonnes/MMBtu (HHV)	0.2	15,888
Flare	natural gas	2	MMBtu/hr (HHV)	8760	4.99E-02	tonnes/MMBtu (HHV)	874	3.90E-06	tonnes/MMBtu (HHV)	0.1	1.36E-06	tonnes/MMBtu (HHV)	0.0	883
TOTAL							**5,138,718**			**4.2**			**58.0**	**5,155,992**

Notes:

1 - Total CO2 Equivalent Emissions is the sum of individual GHG emissions multiplied by the applicable Global Warming Potential. For Example: CO2*(1)+CH4*(23)+N20*(296) = Total CO2 Equivalent Emissions

2 - Formulas for EF syngas calculation for CO_2 and CH_4

CO_2 tonne/MMBtu = (10^6/235.93 Btu/scf (HHV)) x (1 lb-mol/379.3 scf) x (21.18 lb syngas/lb-mol) x (30.59 lb C/100 lb syngas) x (lb-mol C/12 lb C) x (lb-mol CO2/lb-mol C) x (44 lb CO2/lb-mol CO2) x (tonnne/2205 lb)

CH_4 tonne/MMBtu = 3.90 x 10^-6 tonne CH4/MMBtu x (2% CH4 in syngas / 80% CH4 in natural gas)