

**Schrepel, Eric**

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**From:** Phillips, Kendra  
**Sent:** Wednesday, October 06, 2004 7:21 AM  
**To:** Lapworth, Heather  
**Subject:** FW: Comments On The Draft Fifth Power Plan - An Addendum (Benefits Of On Site Generation - Combined Cycle Cogeneration Projects)

FYI

-----Original Message-----

**From:** Jenkins, Kris  
**Sent:** Tuesday, October 05, 2004 4:36 PM  
**To:** Phillips, Kendra  
**Subject:** FW: Comments On The Draft Fifth Power Plan - An Addendum (Benefits Of On Site Generation - Combined Cycle Cogeneration Projects)

-----Original Message-----

**From:** Edward Perrotti [REDACTED]  
**Sent:** Tuesday, October 05, 2004 4:14 PM  
**To:** Jenkins, Kris

[REDACTED]

**Subject:** Comments On The Draft Fifth Power Plan - An Addendum (Benefits Of On Site Generation - Combined Cycle Cogeneration Projects)

White Papers On The Subject Of On Site Power Generation.

<http://courses.washington.edu/cheme445/>

<http://courses.washington.edu/cheme445/fclinks.htm>

<http://depts.washington.edu/fuelcell/>

<http://www.google.com/u/washington?site=search&hl=en&lr=&safe=off&q=Fuel+Cell+Engineering>

<http://depts.washington.edu/chemeng/>

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The Incremental Unit Cost Of On Site Versus Off Site Power Generation

Dear NWPCC,

For some time, it has been apparent to me, that we should be doing an analysis of on site versus off site power generation. On an incremental cost basis, pro forma unit cost engineering economic analysis.

By that I mean looking at this from the incremental view point. Not from a sunk cost

point of view. For example, if we grow the economy and we need to build additional power facilities, yes, we can use conservation and renewable sources, but the incremental reserve requirement, has to be cost projected out.

If the cost of a hydrogen fuel cell at my home is  $x$  per kilo watt hour and if the cost, if permits can be obtained and the damage to the environment can be mitigated, that is added, so that the all in cost of new generation facilities as well as distribution, is quantified and that cost is  $y$ , would not it be best for the user to invest in onsite generation assets, hydrogen fuel cells and combined cycle cogeneration, rather than continue or maintain the status quo?

What are these costs, on a going forward basis and should not our PUD as well as BPA systems not only encourage, but subsidize the development, rather than suggesting that we continue to use gas fired and long lines, that is, high tension voltage lines?

Would not that free up land that could be used for other purposes and also allow for some removal of dams? And if this is so, then would not that be a cost savings and part of the incremental economic analysis and why is the UW not now doing this study?

Would this not change the thinking in the Pacific Northwest to one that is more sustainable?

Edward David Perrotti  
Co - Founder, Technology Planning Associates (aka Risk Analytics, LLC)

Education:

Rensselaer Polytechnic Institute  
BS, Aeronautical Engineering (1969), MS, Management Science (1973)

Harvard Business School  
AMP, Executive Management Program (1975)

Experience:

Philadelphia Electric Company (1969)  
Corporate Finance Dept.

Responsible for the development of new capital market financings for electric and gas utilities as well as energy capital equipment. Arranged debt and equity corporate offerings and created several original lease financing structures for use in power generating plant projects.

Fleet Financial Group (1973)  
Vice President, Capital Equipment Finance

Pioneered the use of leverage lease financings in the utility and transportation industries. Lease financing structures for domestic and international carriers for DC10's, L1011's, 727's and 747's. Privately placed debt and equity offerings. Created innovative aircraft lease financing structures that employed joint venture partnerships with GE, GATX and the Bank of Tokyo. Expert in modeling equipment residual values and tax oriented lease optimization techniques.

Chase Manhattan Bank (1976)  
Vice President - Capital Markets Group

International capital equipment finance. Created the initial off off balance sheet corporate financing arrangements for use in the international oil business. Developed the LTL structure as a means to facilitate the joint venture partnership financing of capital equipment sales. Developed multi-currency and cross border leverage lease financings for German capital equipment into offshore markets. Privately placed leverage lease equity and debt securities.

Texaco Inc (1980)  
Director - International Project/Marine Finance

Responsible for negotiating and documenting all lease financings of VLCC marine vessels, refineries and production facilities. Financings included the Cool Water gasification plant, the LOOP offshore facility, the Highlander project, the Pembroke refinery and cogeneration investments in the US. In addition, arranged lease agreements in the US, Europe and the Pacific (Caltex) with a variety of commercial and investment banks.

Promoted to President, Texaco Marine Financial Services with responsibility for global fleet financial management.

Deutsche Bank Capital Corp. (1986)  
Senior Vice President, International Leasing Group

The structuring of multi-currency cross border tax oriented lease financings for capital equipment exported to the US. Work included the development of programs for Airbus, Daimler, Bombardier and Porsche. Devised a joint venture/partnership subsidiary for use by Messerschmidt in the financing of commercial helicopter sales in the US.

Other:

Adjunct Instructor - US Naval War College, Newport, RI (1975)  
Co Founder - Expert Health Systems, Technology Planning Associates (1991)  
CEO & Founder - Risk Analytics, LLC (1994)

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The Utility Of Marginal Assets.

Time after time, we hear the argument that public programs should be privatized or regulated business be moved to the un regulated form.

In the federalist papers, Jefferson wrote that if all men were angels, there would be no need for government. But the reason that the move to make private or to remove regulation fails, is that there is indeed a paradox.

When you study the role of business over the past few centuries. Business tends to

move into sectors of high marginal utility. We see this over and over again. A business model that has value or utility to the firm is one where margins are sufficient to attract private capital funding.

When the assets are of marginal value or the return on the asset base is less than what would be required to fund it, the public sector finds itself providing these services. In the 1950's the interstate highway programs were all public as the private sector simply saw the returns too low and would not have undertaken them.

The same is true for the public utility and public education programs. The private sector would have to have significant returns in these business models, ones that would attract a capital base. Why we find that certain public activities fail in the private sector, simply unable to provide the returns.

The move to lessen regulations on west coast power failed because the sector had to compete for a capital base, a huge pool of funds that is limited and has to be sufficient so that major capital flows to the higher returns. Indeed the hedge fund industry as the model for mutual fund performance is now seen as the more competitive model.

Those that sought to manipulate, sought to raise prices to the point where capital flows would find marginal assets having a higher value. It did not work. The reason being the capital base needed is huge and would not be available, in the time required, as the market prices simply could not be raised to the levels needed to provide the required values. You simply can not lift step levels by a factor of ten or more in a period of time that is less than a decade, or more.

This cardinal rule was either simply forgotten or ignored.

Investment returns are the key to the private capital decision. The decision to invest or not is based on a risk adjusted set of criteria and some assets simply do not fit this model.

Before you try to move a public program to the private model, ask if the flows are sufficient and if not, what should they be. If then the price factor is a unit several times what the market is currently, then you would need dislocation to get to the required returns.

This exercise was not done. It was never attempted and explains the failure.

This test is simple. Not rocket science. So before you say private this or that as a way to have less government, first do the math and see what prices would have to be, had the sector been one that would be private.

What price level is needed to change the utility of marginal assets.

Edward David Perrotti

Earned a BS in Aeronautical Engineering and an MS in Management Science from Rensselaer Polytechnic Institute as well as an EMP from the Harvard School of Business Administration. His career, in the private sector, as a corporate executive and manager, spanned the years from 1969 to the present. Starting in 1991, he seamlessly moved into an entrepreneurial role, and started a number of very successful technology

and business planning firms.

He served as an instructor at the Naval War College in Newport RI and as a VP of International Finance for the Chase Manhattan Bank. Ed was the President of Texaco Marine Financial Services and an investment banker in New York (Senior Vice President, Deutsche Bank Capital Corp.) before founding Expert Health Systems and Technology Planning Associates.

EdP is considered a global expert in project, corporate and international finance. And he has written extensively on all aspects of optimization theory, derivatives and portfolio (risk) management, using options. As CEO and Founder of Risk Analytics LLC, EdP observes and predicts the behavior of financial markets and foresees global capital issues. He currently advises a set of prominent offshore individuals in the areas of strategic market analysis, risk analysis, international capital markets and the impact of technological innovation on business, government, education and global society.

His expertise has been used, since 1996, to guide a number of critical private global investment decisions and also for corporate risk assessment, management and mitigation. EDP maintains ties to IBM, Microsoft, Intel, Bombardier, Boeing, Northrop, DARPA, Yale and Stanford and is sought after to provide strategic market intelligence, risk assessment and business planning.

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The Opportunity Cost Model.

The Opportunity Cost Of Not Moving To More On Site Electric Power Generation To Meet Incremental Reserve Requirements.

Dear NWPPC,

Thank you so very much for adding me to your mailing list. I have read everything you have sent me.

As we move forward, progress into new technologies, there is a sense that we may want to see things from more of an opportunity cost point of view.

By that I mean look at all possible sources of power generation, including conservation and ask ourselves two questions.

What is the base case? That is, what if we maintain the status quo and how could or would this compare to the alternative, where we see things differently.

The 7e7 commercial airplane is being built from carbon graphite composite materials and we know that the B2 and the F117 were also manufactured from these new materials. This means competition for aluminum and steel and will impact our demand forecast curves. Innovation using new technologies.

But I write to you because we may be at what I call an inflection point. We are seeing innovation now at a pace we have not seen in decades. Why is this? Because we run in cycles and the last one produced the processors that we know today as nano and these computers, on a chip, can run at speeds, cycle time processing, of close to ten giga hertz and process tera bytes of information.

So we are now moving these into our process technology base. And this will lead to even greater productivity in all of our industries. The next great wave of investment is just ahead. But these have implications to electric power generation, as well. Sure some view through the rear view mirror and say, oh too costly, but they need to see ahead, over the horizon. Think ahead, in a forward way, strategically.

We are on the verge of what we saw in this nation in 1904. Amazing things to come.

Many years ago, in the late 1960's up to the early 1990's, I worked in the energy business and saw not only how we could use combined cycle coal gasification cogeneration but also locate this on site. Today the DOE has used this concept in the Future Gen programs, much to their credit and has identified, not only biomass, but many other uses of technology.

The UW School of Engineering, Department of Chemical Engineering is a pioneer now in the research into solid oxide fuel cells using composite (there is that word again) cathodes. Yes there is much to be done. We see Siemens Westinghouse moving into this space and we could see a break through ahead. These technologies had their origin in Germany in 1943.

The Cool Water Demonstration plant in the Mohave desert. But the cost of the base case sees the use of current distribution technologies, something that is over 100 years old and was the one that we saw used by Tesla at the falls, in western New York State.

But with a view of investing in on site, the real benefit of the fuel cell used to produce electric power on site, much as combined cycle cogeneration, but without the burning of fossil fuels, means one thing. The economics now have to change.

The economic analysis is not just wrong by comparing apples to oranges, because when you have a technology like a hydrogen fuel cell, on site, you don't need to have a gas fired power plant located off site, in a remote location. And you don't need to construct or build and maintain miles and miles of costly high tension voltage lines.

So when you run the numbers for the alternative case, the investment in these new technologies, you have to add in all the avoided costs and if you do, you see the savings and they can be quantified and added to the return in the projects where you have these on site technologies.

They are savings over the base case. And belong in the investment as the opportunity cost if you do not invest. They are indeed savings to the base case and make the investment in fuel cells even more attractive. The monies you do not outlay for the lines and the land use lost are revenues to you when you employ or expand the use of on site.

So on site is less costly, even with the fuel cell. Look at the savings and you have not even added in the cost of cleaner air and saving salmon, less dams.

Edison knew this, but he had a hard time selling this, as the economies of scale back then favored Tesla and George Westinghouse. Today that is reversing, much as AC reverses direction.

I would be pleased to discuss this further and maybe do a sample economic analysis for your agency at no charge. Please feel free to contact me by email or visit me at my home, my door is always open.

Very sincerely yours,

Edward David Perrotti  
CEO and Founder, Risk Analytics, LLC (aka Technology Planning Associates)

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Wireless Broadband Internet - Your Story In The PI Today (Good Job). But Maybe There Is More?

[http://seattlepi.nwsourc.com/local/176835\\_internet08.html](http://seattlepi.nwsourc.com/local/176835_internet08.html)

If you have wireless broadband internet, then how far behind will be wireless electric power, on site generation, using a hydrogen fuel cell (like what we see being done at the UW - solid oxide with composite cathodes).

Like a Trane compressor at your home to heat and cool it? Would this then not free up all this land we use for these high tension power lines and move us away from burning fossil fuels?

Would you write a story about this and maybe it is in our future to do this.

Interview the UW School of Engineering, Department of Chemical Engineering ([stuve@u.washington.edu](mailto:stuve@u.washington.edu))?

In Seattle to lead the nation, be first to do this to. Surely this would have great impact on dams and fish and clean air and water. Would it not?

Very Sincerely yours,

Edward David Perrotti

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Would not that free up land that could be used for other purposes and also allow for some removal of dams? And if this is so, then would not that be a cost savings and part of the incremental economic analysis and why is the UW not now doing this study? Or the NWPPC?

Would this not change the thinking in the Pacific Northwest to one that is more sustainable? As well as all of the power markets on the west coast?

Edward David Perrotti  
CEO and Founder, Technology Planning Associates (aka Risk Analytics. LLC)

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### Bonneville Power And The States It Serves

If the BPA has huge losses, then on a cash flow value basis, it has a low cost of acquisition, that means it should be sold for far below book value. The opportunity for the States that the BPA serves is two fold and not paradoxical as some may say.

The States form a body or agency and the BPA is moved from the federal agency to the one owned by the States. Then the states decide what to keep and what to sell off. The federal government just sold land in Utah to the State of Utah for around \$13 million. The property has a market value over the next ten years of over \$183 million.

See that is the key. Our PUD Boards now should think about an initiative and try hard to at least see what the benefits will be. The cost of acquisition is low and spread out over the states and can be financed. The federal government would let BPA go at a really good price. Then the states sell pieces off and they pay back the debt incurred to finance the purchase.

That is what many are missing. The cost to buy the BPA is lower than most think, as it will be sold at below book value, due to the losses, and once acquired and slices sold to the utilities that make up the three state region, the three states would have an agency that would pay for itself and most likely pay off most of the debt incurred to buy BPA.

This is what is best for our region. Surely, the states are now regionalized and can solve these problem, if they are given the chance.

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### The Future Role Of The Bonneville Power Authority In Regional (Pacific Northwest) Power Supply.

## Why Our Northwest Power System Needs to Be Regionalized Not Privatized.

Bonneville Power Authority is there now for the federal treasury. It should be moved from a federal agency to a regional one, controlled, on a pro rata, pooling of interest basis, by those states that pay for the resource. The states that buy BPA power should control that agency.

Then you have economies of scale, what is lacking now and why our rates are going higher. The system now is skewed toward a very fragmented model, where these small local PUD, in some cases, felt they had to invest in upstream power assets. They do not have the resources to finance these units from their current ratepayer base. Indeed, some fall deeper in debt and have eroding cash reserves and losses as far as the eye can see.

We should not have shifted this function to the local PUD as they also do not have the staff people expert in all the feedstock cost structures as well as all the various power technologies. In some cases, the system is biased and can not be optimized. We have to move to a central power production and distribution agency that realizes economies of scale and passes them along to the downstream PUD. Do not try to move risk management into these firms, that is a sole top down function and not bottom up. Any major corporation will tell you that you need a central hub for control, not spread out all over the operating divisions. But in the central headquarters, where planning and other functions, like risk management, purchasing are done optimally, at the top.

This is a formula for disaster and it was a mistake to allow this. How can the system realize true economies of scale from centralized supply chain management or in this case, power purchase supply contracts, when it is tossed down into the lowest of units, that have no way to buy or make, with the kind of purchasing capability, had they been tied into a central function? Even the best military systems know this is wrong, you need central controls. Why Enron was such a mess, who was in control?

This is the reason for some to want to combine Aberdeen and Hoquiam, as you realize economies of scale in the supply chain or combined purchasing function. **WE ARE PAYING HIGHER POWER RATES, IN PART NOW, BECAUSE WE HAVE A FRAGMENTED MODEL, SPREAD OVER MANY ENTITIES, THAT LACK COMBINED SUPPLY CHAIN CAPABILITY AND A BOTTOM UP SUB OPTIMAL SYSTEM.**

In some cases, sell the assets up to the state controlled regional agency and re capitalize the PUD system. Build up cash, not power plants and remove this burden from the local ratepayer. Put the local PUD cash flow stream in the right direction, positive rather than negative and start to lower our rates. The regional agency, controlled by the states, can issue bonds and can best decide the mix of power sources that result in the lowest possible cost of service and therefore, electric rates.

We do not compete with ourselves, that is illusory. We compete with BC and BC hydro. BC has lower cost and more abundant hydro and a more favorable rate of exchange. While we are at it, we have to lift these

soft timber tariffs, else all our mills, here on this side of the border, will be marginalized. We do not need further mill closures and layoffs in the forest product sector of our state economy.

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### The Electric Utility Business - The Opportunity Cost Associated With Purchased Power.

At the Harvard Business School, as well as Stanford, the MBA student is taught about portfolio management and the concept of asset and liability management, that is the best way is to match assets (the customer base or revenue stream) with how you finance that base (in the case of the PUD, the sources of purchased power). Drop by anytime and I will show you both the heuristic and deterministic models to use to see whether or not the PUD system is sub optimized.

But one thing missing in the energy policy debate is that the customer use profile has an embedded opportunity cost associated with it. If as a residential user, I use less, than less is indeed more. That means the PUD uses substitution for purchased power. Conservation is another source of power, because the more we conserve, the less the local PUD has to buy or make itself, thus saving as compared to the case where we just waste electricity.

Indeed if a user generates their own power with cogeneration or they use a fuel cell at their home, home office or office to partially carry the load, then the local PUD has savings that would otherwise not be the case, had that customer just consumed and not conserved or made power themselves.

So if the conservation efforts save 10% of load, that is 10% less required to buy on the market, or make yourself. Ten percent less natural gas fuel used, less in the way of new lines and stations. Lowers the capital and take or pay operating cost to the PUD system.

This means that local, state and federal agencies should be be subsidized by the PUD system with lower rates, than would otherwise be the case, had they not used fuel cells and cogeneration. Indeed GH Paper and Weyco and others that employ cogeneration should receive lower rates for purchased power from the PUD, had they not generated part of their load themselves.

Why the BPA policy of raising rates to fund the federal treasury deficit is misguided and simply not working. Hurting the economy of this state and the entire Pacific Northwest. Why we need to elect US Senator Patty Murray. Return control of the US Senate to the Democrats.

The Bush energy plan does not take into account the intrinsic and imputed values, the opportunity costs. If we do nothing, as the Vice President says, the cost of not doing this is so much higher than the cost of doing this.

If rate setting uses this model, if user conservation is seen as a replacement and a substitute for generation, then we need fewer major power facilities and fewer

high tension distribution lines. For conservation is the same as generation on site and fuel cell use and cogeneration are load reduction vehicles.

So less is more. More clean air and more savings to the PUD. Maybe it is time to study this and look at these rate models. The base case is maintain the status quo and the alternative - encourage use of on site generation, in the form of conservation, fuel cells and cogeneration.

What would be the optimization model. A deterministic dynamic programming model that applies slack and surplus variables and quantifies the opportunity cost that is saved due to means that lead to less purchased power by the PUD system.

And then maybe we can have our cake and eat it too. Pay the cost at these dams to save the salmon. These two are not mutually exclusive or exhaustive. If you do the math and some of it is rocket science, optimization models, we could have lower rates, less pollution, less high tension lines, fewer power plants and dams that save fish, not destroy them.

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Why BioTech And BioDiesel Could Help This County To Grow - Increase The Tax Base, Jobs And Incomes.

Reducing Our Dependence On Foreign Sources Of Crude Oil.

We have huge amounts of waste in this country. If the Congress passes this plan to clear these national public forests of their dense under growth, the so called fuel load and thin these lands, so the fires will be less of a threat, then what do we do with the organic waste?

We would not want to cart it to a landfill or burn it in an incinerator. So we want it to undergo a rapid decomposition and then use the decomposed material, you know, recycle it. The State of Washington has stated, on many occasions, that it seeks a robust Bio Technology industry here, so that we have a greater tax base, incomes and jobs.

The Bio Tech sector creates compounds that are used in a variety of ways. Some for new drugs, but others are used in agriculture. So it is not unreasonable to expect that the biochemical engineers that create these new compounds, could make one that breaks down the fiber in waste organic materials, such as that found in the plant materials we call the "fuel load" and turn it into a raw material source for new biomass energy fuels.

One of these fuels is bio diesel. It takes a lot to make a gallon of this fuel. Those doing research now have web sites and they promote it as the diesel fuel of the future. A way to have cleaner air and it burns so that the exhaust does not stink as bad. So some see it as an additive to petroleum diesel and blends that could give us cleaner air. Many now use plant oils, like vegetable oil, or soy bean oil.

It takes around 8 pounds of oil to make one gallon of bio diesel. An email from British Petroleum showed a number of web sites they have on this new bio mass fuel. So if we are to groom or thin 40 million or more acres of these public lands, could we not take the waste and then use an enzyme to

convert it to another raw material source? The BP links are shown below.

<http://www.ecdiesel.com>

<http://www.ecdiesel.com/about/contacts.asp>

[http://www.ecdiesel.com/environment/ecd\\_other.asp](http://www.ecdiesel.com/environment/ecd_other.asp)

A new and plentiful feed stock, maybe one that is more cost effective and make bio diesel fuels. So if this is possible, then would it now combine two sectors of our economy - the bio tech sector and the forest products sector to create new jobs, income and growth, while, at the same time, making our air cleaner and our diesel systems less dependent on foreign sources of oil?

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The Benefits Of The Energy Plan And Forest Plan For The State Of Washington.

This state wants to have a robust economy. Jobs and income. We also want to have a Biotech industry here.

The Biotech firms basically use biochemical engineering to create new enzymes. Some of the enzymes are able to break down organic waste material and then use that as the feed stock for a variety of bio mass fuels.

One of these fuels is bio diesel. The energy bill provides for the use of a variety of biomass sources. So the effort of this state to attract Biotech firms and the move to expand biomass energy sources are connected.

But there is more. The forest plan would allow for the reduction of fuel load from these public lands. The fuel load is made up of dense under growth that may not have any commercial worth. This dense organic material could well be the feed stock source for biomass fuels.

The Biotech firms could synthesize an enzyme that breaks this material down into a soup that would be a low cost source for biomass fuels. The energy bill has provisions to expand the use of biomass fuels, so that as the production comes on line, the prices will decline and be more affordable.

We have the land and the resources and the engineers that graduate with a degree in Chemical Engineering from Washington State University. So there is something in it for everyone - more jobs, a stronger economy and more income. So we can build new schools and hire new teachers.

Please see that this state has a growth future and we should all be proud of the fine state we live in. The future is indeed ours to hold and we can have a stronger economy in the State Of Washington, if we all work hard and learn about how all these technologies are really integrated and how they will work to make our lives

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