ATTACHMENT 5

California Energy Crisis JBS Energy, Inc. Energy Instruments Hydrology MAD Home California Energy Crisis JBS Bibliography Stranded Cost Billing & Metering Stranded Debt Stranded Cost A New Trend Customer Charges How We Got into the California Energy Crisis By William Marcus , JBS Energy, Inc. Jan Hamrin, Center for Resource Solutions Contrary to popular opinion, the California energy crisis was not the result of environmental regulations that prevented power plants from being sited or even entirely the result of the state?s electricity restructuring legislation. The present crisis is the result of a complex web of events many of which predate the state?s actual electricity restructuring, and many that were not even a part of restructuring. However, all the events impacted the nature of the restructuring that ultimately occurred. This paper focuses on the primary factors that have contributed to today?s crisis and draws some preliminary ?lessons learned? for others working in electricity sector reform. There are two main parts to the story ? an electricity piece and a gas piece with four important elements that contributed to California?s electricity sector collapse: (1) Insufficient generating capacity; (2) insufficient natural gas capacity; (3) a disconnect between changes in environmental regulation and changes in the electricity sector; and (4) competitive self interest in conflict with the public interest, as well as market power abuses. A number of other elements also come into play such as changes in the electric utility holding company rules and how the refinancing of debt was handled in California. These and other elements have an affect on the market situation and may affect how solutions are crafted but are not included in this paper due to space and time constraints. How We Ran Out of Electric Generating Capacity The process of electricity restructuring begins the first day rumors surface that government is looking at reforms in the electricity sector. For California, that was sometime in 1993 before the California Public Utilities Commission (CPUC) had even issued their now famous ?Blue Book.? As soon as the state?s large industrial customers began talking publicly about restructuring, the state?s three investor owned utilities (IOU) (Pacific Gas and Electric Company ? PG&E; Southern California Edison Company ? Edison; and San Diego Gas and Electric Company ? SDG&E) began circling their wagons to protect their markets, eliminate competition, and reduce any potential damage to their company or their shareholders. This behavior, which was totally rational from their perspective, set the stage for the generation shortfalls we are presently experiencing. But others made some contribution to the present situation as well. The California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission in Washington D.C. (FERC) felt state command and control regulation was reducing efficiency in the electricity sector. They wanted to insert some of the discipline of the marketplace into an industry that had become more expensive and inefficient than necessary. They assumed the role of forcing change. The regulatory structure that existed prior to restructuring was not serving all of the public?s interest that well given economic, environmental and technology changes in recent years. The environmental community was frustrated with the slow response by utility regulators to environmental problems caused by electricity generation. Independent energy producers were frustrated by a lack of regulatory support for cogeneration and renewable energy facilities. Large business and industrial consumers were frustrated by higher electricity rates in California than in other parts of the country and the representatives of small consumers often felt their client?s needs were being given short shrift in the regulatory balancing act. Another actor in this play was the California Energy Commission (CEC). This state agency had a history of electricity demand forecasts that were much lower, and in the past more accurate than those made by the State?s private utilities. However, in 1995, the CEC failed to recognize that demand projections couldn?t decline indefinitely unless the state was actually in a negative growth scenario, which it wasn?t. Moreover, the CEC was proud of its past energy efficiency successes causing them to support an overly optimistic forecast of future energy savings that were never realized. The CEC also had a long history of supporting power purchases by California utilities from other states ? this history was in part institutional and in part responsive to the utilities themselves, who proposed to rely on short-term purchases from the Pacific Northwest to avoid new generating capacity. And so the play begins. In 1995, the latest CEC biennial electricity planning document was issued saying that the world would be hunky-dory, with reserve margins in 2001 in the range of 21-23% for PG&E and Edison, when only 16% was needed ? in other words, power surpluses of about 2000 MW were expected between the two companies. However, that rosy assessment relied on

a number of resources that, when push came to shove, were not there: n Almost 1400 MW of renewable and cogeneration capacity (684 MW Edison, 246 MW PG&E, 451 MW SDG&E) was to be acquired through an auction that was bid but never purchased because the utilities petitioned the FERC to kill the auction as discriminatory against other power generators. Edison claimed that it did not need power until 2004 one month before it cancelled the conservation on which that forecast was based (see second bullet below). California spent $90 million of ratepayer money in AB 1890 (the state restructuring bill) to offset liability costs incurred by the utilities for killing these contracts and didn't get a single kilowatt-hour. n Nearly 2300 MW of uncontracted "spot" capacity (1700 MW for PG&E and 588 MW for Edison) from Northwest and Southwest sources was optimistically projected in the CEC forecast. In reality in the year 2000, the Northwest and Southwest had very little excess energy to sell and were demanding cash on the barrelhead to sell what little they had (refusing to accept credit) until USDOE stepped in. n Over 2000 MW of energy efficiency was forecast that the private utilities had no intention of ever acquiring, by the time we got to 1994. Edison in 1991 claimed that it would acquire ?all? cost-effective conservation (259 MW per year from 1995-2000 in 1991, 212 MW per year as estimated in 1993). PG&E and Edison were projected to acquire 100-150 MW per year each, at the same time as they were cutting their budgets in response to performance-based ratemaking incentives and acquiring only 40-70 MW per year each. Even with the lower energy efficiency budgets, the utilities did not spend what they had been allocated. Every megawatt of unpursued conservation equals about 1.2 MW of needed new power plants after including calculations for reserves and system losses. n 2500 MW of interruptible service contracts were signed with large commercial and industrial customers by Edison as a method of inducing large customers to stay with the Company through attractive multi-year contracts. Though many customers claim they were told they would never actually have to be interrupted, Edison asserted to the CEC, CPUC and FERC that these contracts were as good as new power generation. All these subtractions brought California to today?s supply mess. The 2000 MW surplus becomes a 2000 MW deficit, with reserve margins in the 8-10% range. The private utilities were cutting the energy efficiency budgets and acquisition levels back by thousands of megawatts and refusing to acquire the 1400 MW of clean cogeneration and renewables that were cheaper than utility power plants, simply because they were from competitors. How We Ran Out of Gas Part 1 of this jeremiad examined the failure to build renewables, cogeneration, and undertake forecast energy efficiency, while relying on out-of-state power that turned up missing during the summer of 2000. In Part 2, we look at this winter's problems, which are heavily driven by the gas side of the equation. The California gas system has never had enough pipeline capacity to meet winter demand. Significant amounts of gas need to be stored in the summer and withdrawn in the winter. Both PG&E and SoCal Gas have large storage fields, which in the old days of regulation were used year after year to assure that adequate gas was available for the winter season. Now let's look at 1992-93, when the picture changed. California was unbundling its gas system to make it competitive (or at least cheap) for large industrial customers and power generators. Through changes in FERC regulation, there would now be a ?free? market for natural gas. At the time, large customers claimed they didn't need storage (or at least as much as was in their rates) and shouldn't be forced to pay for it. In 1993 the CPUC separated storage from other gas services. The gas utility was required to reserve storage for core customers and for hourly and daily load balancing by non-core customers, but non-core industrial and electric generation customers could buy the storage that they wanted on their own through auction and contract processes. Large customers were not required to buy storage but would make decisions on how much to acquire based on market forces, rather than regulatory fiat. Small customers did not complain too much, because, after all, large customers at the time had to have oil or propane backup in order to be non-core customers. They were choosing between storage and burning oil. And the electric generators using natural gas were primarily utilities that would make prudent decisions to assure the reliability of electric supply. Reliability would not be compromised if a few industrials didn't buy storage. Moving forward in time, three large factors changed. First, the requirement that non-core customers have alternate fuel capability was dropped (as being unnecessary because of the surplus of gas pipeline capacity that developed in the early 1990s), and many air districts restricted the ability of these customers to burn oil. So they now have both no storage and no alternative

fuel. Second, the gas-fired power plants (except for two small ones in the PG&E area) were sold to new owners, and were no longer owned by the utilities that put gas away to assure reliability. Third, the Federal Energy Regulatory Commission removed all price caps for short-term sales of gas pipeline capacity in Order 637 in the spring of 2000. The stage is now set for our winter disaster. Gas became expensive in the summer months of 2000 due to the high demand for gas in the electric generation sector. The non-utility power generation sector (the most sophisticated electric and gas conglomerates in the United States) and industrial customers decided that storage wasn't necessary at all and bought almost none of it for the winter of 2000. Gas in storage on November 30, 2000 for the account of industrial and powerplant users on the Southern California Gas system was 89% below the average amount in storage for the same users on the same date in1998 and 1999. They actually withdrew 64% of the paltry amount of gas they had in storage as of October 31 during the month of November. Then two things happened at the El Paso Natural Gas pipeline. The first was a decision to sell off all surplus pipeline capacity on El Paso to an unregulated affiliate for a fixed price. This got rid of a pesky requirement that El Paso give 35 percent of revenues from this pipeline capacity back to its firm capacity shippers (and eventually to small core customers in Nevada, Arizona, and New Mexico, and to large non-core customers in California due to different regulatory regimes). The second was an explosion that crippled the pipeline for weeks and indefinitely left it with only 85 percent of rated capacity for five months (because it allegedly could not be shut down for repairs to return it to full capacity). So now, we have a pipeline system that has lost at least 5 percent of its statewide capacity and can't fulfill California's needs at full capacity. We have a hungry unregulated merchant marketer prowling around ready to profit instead of a stodgy old utility that had to share its profits with ratepayers. The California border price for gas started to rise in the late summer and early fall well above the cost of gas in the rest of the country. The differentials were now a dollar or two per million (MMBtu). Even so, SoCal Gas was using 100% of its remaining capacity allocation to bring gas in and store it for the winter. This explosion thus had the direct effect of causing SoCal Gas to store about 14% less gas for the winter (as of October 31). And then it got cold. There were forecasts of a colder than average winter and of an Arctic blast hitting California and the Pacific Northwest in the next week. The realization that far less gas was in storage this winter than in past years hit the market. The difference between California prices and national gas prices rose to unprecedented heights from typical levels of 25-50 cents/MMBtu. Gas prices rose first to the $15 range and then to $20, $40, $60, the sky's the limit. All of that money went to the owners of pipeline capacity. The prices served the economic function of rationing demand down to meet the supply -- which the market did with ruthless efficiency, closing one industrial customer after another across the coastal west. While California spot gas prices finally settled somewhat at Christmas time, they are still volatile and ranging from $2-$8 more than national gas prices. Gas rates for small customers at first did not rise that much, because the firm capacity reserved for small customers saves small customers from the worst of the price gouging. In December, we were grateful that we're "only" paying $8 or $9 per MMBtu. And for power generators? The gas was simply a pass-through. All of them use it. All of them charge for it at spot market rates, regardless of whether they bought it at hedged prices or not. They blew past FERC and the ISO price caps as the cost of gas reached $25 per MMBtu. ?We can't generate because our gas costs too much with the caps,? they say. And the ISO acquiesces. But a new problem emerges. We can't afford to pay for all of this extremely expensive electricity. It will bankrupt the entire state. Capital goes on strike. The power generators head for the door, threatening rolling blackouts without cash on the barrelhead, until DOE Secretary Richardson intervened using arcane emergency powers from the 1973 oil embargo. And that's where we stand today, at least until February 7th, when the new Bush Administration has set as a drop dead date for fixing the problems. There are financial externalities in the gas market that cause the bad decisions of one set of market players to hurt everyone. Economic theory suggests that physical transactions and financial transactions are largely equivalent. But economic theory in this case is simply wrong. This is one of the financial externalities that free-market proponents tend to ignore. Gas storage in California is vital and yet gas storage was traded for financial hedges. Storing gas in the ground is good for keeping California?s energy prices down. But financial hedges don?t put a bit of gas in the ground. If everyone

hedges financially, and pipeline capacity gets short, we end up with our current disaster. Financial hedges are not the same as physical hedges if you still have to physically deliver. And that is the squeeze we are in right now. If it were not for the electricity/gas linkage, the disaster might have been lessened. However, the power generators, whether financially hedged or unhedged are charging for electricity based on the unhedged spot market price of gas, and society as a whole is being required to pay it. We have the competitive pass-through effect, which is just as powerful as the inefficiency from regulatory pass-through that free-market supporters have decried for years. Separate but Equal ? Environmental Regulation While people were discussing reforms for California?s electricity sector, environmental regulation was under reform pressures as well. California legislation that had up to the mid-1990s required selective catalytic reduction devices (SCR) as the best available technology for reducing NOx emissions from fossil power plants was drastically modified in the South Coast Air Quality Management District (SCAQMD) of California. Southern California Edison argued that SCR was too expensive and that instead SCAQMD should adopt a credit trading system to control NOx emissions. That alternative was adopted with the underlying assumption that the electricity sector would continue to function as it had in the past. Immediately a number of things went wrong. First, too many credits were issued and most of them were issued to the private utility ? Southern California Edison. As a result, Edison didn?t need to clean up its power plants with all the credits issued to them directly and the credits that could be purchased very cheaply in the marketplace. Then electricity restructuring came onto the scene. Edison sold the fossil plants it owned that were located in the SCAQMD area. The credits went with the plants. By the year 2000, the planned reductions in the pool of emissions credits kicked in, intended to force actual cleanup. At the same time, the supply/demand for electricity caused generators to run their power plants more than assumed in the south coast environmental plans. The demand for NOx credits escalated, the market price of credits rose dramatically thus raising the cost of electricity from these plants by at least one cent per kilowatt-hour if not more. As the situation now stands, SCR could have been purchased for the entire fleet of California natural gas plants for the cost of the NOx credits in the South Coast area alone, as passed through into California rates. Market Power and Rational Behavior vs. the Public Interest As one colleague said, ?if you don?t set a speed limit, don?t be surprised when the traffic goes very fast.? At this point the California restructuring legislation enters the picture. The state?s restructuring plan was designed based upon a set of assumptions, most of which proved to be incorrect: 1) There was enough supply reserve for many years; 2) New power plants would cost less than old ones and thus new supply would be built when it was needed; 3) Old, dirty plants will not continue to run; 4) There would be robust competition in the wholesale and retail electricity markets; and 5) Consumers would have accurate information upon which to make rational decisions about how much power to use, when to use it and the options available to switch to alternative suppliers. We have already discussed some of the reasons the first three assumptions turned out differently than expected. Now let?s look at the last assumptions. Since late summer of 2000, the whole cost curve of the electricity market has shifted upward and not just from increased natural gas prices. Under a regulated utility structure, scheduled maintenance of utility generating units was closely coordinated. If a major generating unit was out of service, the maintenance for other units was rescheduled to ensure adequate generation supply. However, under the new restructured electricity plan, scheduled or unscheduled generation outages are no longer coordinated. The private utilities? fossil generation was sold to new owners. In fact, the same company often purchased several fossil plants. These fossil plants tend to be the incremental ?price setting? units in the California energy marketplace. As a result, as supply got tighter and tighter during the summer of 2000, if one of the larger units went off line for maintenance, the other units (including those owned by the same company) were able to command a higher price for their power. These fossil plants had originally had two-year operation and maintenance contracts back to the utility that had sold them. The operations people reported directly to utility managers who had an incentive to keep prices down by coordinating outages. By the end of spring those contracts ended and the new managers had no such incentives. The forced outage rates of power plants everywhere escalated rapidly creating even higher energy prices. Capacity withholding has now become a serious problem. It is not something that is easy to prove, but the overall statistics are dramatic. Forced outage rates for

California natural gas plants over the past five years have gone from the traditional 5 to 10 percent per year outage rate to an average of almost 50 percent. Of the 47,500 MW of regular capacity scheduled by the California Independent System Operator (ISO) who schedules the power generated into the grid, 10,000 to 12,000 MW have been out of service since late last summer. When capacity withholding is combined with strategic bidding, the market is subject to manipulation that can cost ratepayers billions of dollars. Though distributed generation (small generation located within the distribution system) could be part of the solution, it has encountered its own set of problems. The independent system operators do not like dealing with smaller generators. It is much easier to work with a few large plants than with a bunch of smaller guys (10 MW and under). So at the same time that the state is suffering from massive power shortages, the ISO is ignoring federal rules governing purchase and sale from cogenerators, and imposing rigid constraints on the ability of smaller generators to sell power into the transmission grid. In addition, Southern California Edison Company has refused to take power from some wind generators due to transmission line constraints. Transmission line upgrades could be less expensive than the cost of alternate sources of power. But the old corporate prejudices against small generators and renewable sources of power persist even into a power crisis. Meanwhile, no competitive retail market has developed either. Many of the regulators and legislators who designed the California restructuring rules saw their role as protecting the interests of the private utility companies and keeping big business and industry in the state through lower wholesale electricity prices. As a result, the rules governing participation in the retail electricity market were not conducive to the development of robust retail competition. In addition, the public information campaign funded by ratepayers to explain restructuring to the public was confusing at best, and probably designed to discourage retail choice. Because there was no opportunity for price competition in the retail market, the only way to differentiate electricity being sold by other marketers was by its environmental attributes. Because there was perceived a latent demand by small California consumers to choose cleaner electricity, renewable energy retail marketers were able to carve out a niche despite unfavorable market rules and confusing public information. It remained, however, a difficult and expensive retail market to enter since small consumers had such poor information concerning the options available to them. Lessons Can Be Painful Thus, we find ourselves with an electricity sector where private actors are behaving rationally given their own self-interest and the rules governing the marketplace but the results are disastrous because of insufficient concern for the public?s interests. A convergence of events has negated most of the assumptions that supported the original restructuring design. The lack of effective communication between various government stakeholders further undermined the process. And finally, protection of the public?s interests was delegated to an efficiently functioning marketplace that does not exist. There was a serious lack of congruence in the role various government stakeholders thought they should play in the new market structure that resulted in unrealistic expectations and left large gaps for mischief to occur. The following are some of the lessons learned: Electricity has a large public interest component that must be explicitly addressed in the design of a reformed electricity sector or the public?s interests will not be met. Protecting against improper use of market power, protection of smaller consumers and good quality public information become important tasks for government under market-based utility structures. Robust competition, informed consumers and a fair marketplace result from explicit action, they don?t happen automatically. * Though the market players in California behaved rationally given their self-interest, no one took responsibility for looking after the public?s interests. Most government entities saw their roles as protecting incumbent utilities, large business (electricity) consumers, and the new gas and electric conglomerates that entered the electric generation arena. What?s good for the utility is not necessarily good for the public in a market-driven system. * The most dedicated advocates of electricity deregulation in the US tend to not be sympathetic toward or even support public interest issues associated with electricity generation and service. So, though it might be theoretically possible to design a market-based system that meets public interest needs, it is not likely to occur under the control of most deregulation proponents. * Specifically, it is of critical importance to retain energy conservation and renewable energy objectives (through efficiency standards on equipment, and programs to encourage investments in energy efficiency and renewable energy) despite claims by many advocates for

deregulation that ?the market? will do it right. * Markets are good at short-term trade offs but are not good at explicit tradeoffs between the present and the future or incorporating externalities such as environmental costs and benefits unless designed specifically to consider those elements. * Short-term markets tend to be highly volatile. Electricity consumers are more risk averse to price volatility than to the absolute price of power. Designing the electricity sector to be entirely dependent upon short-term market signals will result in a situation where electricity consumers will not be happy. * Part of any policy design process should be an examination of the underlying assumptions, to test how the design options will function if one or more of the assumptions turns out to be the different from what is expected. * It is not only useful to evaluate the assumptions underlying the decisions to be made, it is also useful to reexamine decisions made under past circumstances to test if the decision is still relevant under new circumstances (e.g. the gas storage decisions). * Electricity reform affects all aspects of a society. Frequent and good quality communication between various governmental actors is essential to avoid serious policy mistakes (e.g. the changes in air quality rules in Southern California). * Physical hedges and financial hedges are not equivalent if the product still must be delivered physically. * The California situation is not unique. Though some circumstances may be unique to this situation, most of the underlying factors that can cause market dysfunction can and are occurring in other venues. We do have a global economy and news travels fast including the knowledge of how to skillfully game the system. JBS Energy, Inc. · 311 D Street · West Sacramento, CA 95605 phone (916) 372-0534 · fax (916) 372-1624 · E-mail