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❖ **INTRODUCTION**

- In the book *Collapse*, Jared Diamond describes the demise of a once vibrant civilization that inhabited Easter Island.
 - For those of you unfamiliar with Easter Island, it is one of the most remote places in the world, located 2,500 miles west of Chile. I know, I was there last year.
 - It is known principally for its massive stone sculptures, standing as high as 70 feet, portraying stylized human figures.
 - Imagine taking a block of stone weighing as much as 270 tons from a quarry, carving it into a human form, transporting it as far as 9 miles away, and then standing it on end, all without the benefit of modern technology.
 - In many ways, these statues testify to man's ability to harness the natural world to his demands.

- At the same time, they are a profound reminder of how failure to manage our natural resources can lead to disastrous consequences.
- I say this because it was these sculptures that ultimately led to the collapse of the civilization on Easter Island.
- The process to transport and raise these statues relied heavily on wood, which was used for creating the sleds and ropes to haul the statues from the quarry, and the levering mechanisms needed to raise them to their final positions.
- As the number and scale of statues produced increased the Easter Islanders depleted their wood supply.
- The loss of forestland had a domino affect that spilled into all aspects of their society.
- Without wood, they were unable to make canoes and fish, wild-game became scarce due to loss of habitat, and their ability to make shelters was compromised.
- Crop yields plummeted as the soils, no longer contained by tree root structures, washed or blew away.
- Societal instability and decline followed.
- There are 3,000 people living on Easter Island today; at its peak there were 25,000.

- The parallels one can draw between the collapse of this civilization due to environmental degradation and the threat global warming poses today should be obvious.
 - Our reliance on fossil fuels to support a lifestyle that demands very high levels of energy services is overwhelming the equilibrating mechanisms of the earth.
 - Two recent reports issued by the UN Intergovernmental Panel on Climate Change show that human industrial activity has led to substantial increases in the concentration of CO₂ and other greenhouse gases in the atmosphere.
 - These increasing concentrations have caused a slow, but inexorable increase in the temperature of the planet.
 - Left unchecked, these increased temperatures will wreak havoc on the global economy.
 - According to the stern report Commissioned by the British Government, the costs attributable to global warming eventually could exceed 20% of global GDP.
- Although California has long been a leader in pushing a more sustainable approach to energy, the last several years have been particularly notable in terms of the degree to which climate change has been moved to the forefront of our energy agenda.

- California has implemented numerous policies that I would characterize as being largely motivated by the issue of climate change.
- In my remarks today, I am going to focus on three in particular:
 - the California Solar Initiative,
 - the Renewables Portfolio Standard,
 - and AB32, the Global Warming Solutions Act of 2006.
- With regard to the California Solar Initiative and the Renewables Portfolio Standard, while climate change has become one of the principal justifications for pursuing these policies, there are reasons in addition to carbon mitigation for implementing them;
 - Resource diversity provides a strong rationale,
 - As do local and regional air quality concerns.
- That said, climate change has become the overriding imperative.
- Although each of these approaches is significantly different in how it stimulates market activity, each has the goal of facilitating greater investment in and adoption of environmentally sustainable generating technologies.
- Historically, California, and the U.S. more generally, have focused on bringing the costs of alternative energy down

through programs that offer direct incentives to specific technologies.

- Programs like the federal production tax credits for wind and solar, and state rebate programs, like California's Solar Initiative, which I will describe in more detail later in my remarks, are examples of this approach.
 - The effectiveness of these programs in stimulating market activity depends largely on the degree of certainty that industry and the financial community have that the incentives will be around long enough to meaningfully support investment.
 - For policy-makers, the hope is that these policies can grow an industry until it no longer needs these incentives in order to compete.
 - Of course, this approach is not guaranteed: it requires policy-makers "pick the winner", by designating which technologies are eligible for incentives, and hoping that the chosen technology will experience cost reductions that allow it to compete without support.
- More recently, the trend has been toward regulatory approaches that are less technology-specific.
- These can be mandatory programs, like portfolio standards, where failure to procure some pre-defined

- amount of renewable energy results in substantial penalties,
- or regulations that actually put a price on environmental externalities, like carbon.
- These approaches are, by design, more technology agnostic, and thus tend to be preferred by economists who believe that the market should be responsible for sorting out how to achieve a certain result.
- In some important respects, portfolio standards function in much the same way as technology specific rebates:
 - by providing a guaranteed market for renewable energy, the financial community is given a clear signal about where to invest.
 - In turn, this investment should drive industry growth and innovation, thereby driving costs down until renewables no longer require this kind of support.
 - Of course there is an element to “picking the winner” here as well.
- This brings me to the final and least technology-specific policy option for driving the development of alternative energy sources: pricing the externality.
- In California we already on this path, pursuing a number of policies that explicitly address greenhouse gases,

culminating with the passage of AB32, which will place a statewide cap on carbon emissions.

- The cap, combined with a penalty regime that fines covered entities for emissions in excess of what they are authorized to emit, will, when fully implemented, put a real price on carbon.
- Unlike technology mandates, this approach leaves it to the market to find the least-cost path to reducing emissions.

❖ **THE CALIFORNIA SOLAR INITIATIVE**

➤ I'd now like to discuss some of the specific policies that we are pursuing as part of an overall emission reduction strategy, beginning with the California Solar Initiative:

- Originally envisioned as the Million Solar Roofs Initiative by the Governor, the California Solar Initiative, or "CSI" is among the largest solar incentive programs in the world.
- It earmarks over \$3 billion toward the development of a self-sustaining solar market by 2017, through the deployment of 3000 MW of solar photovoltaics.
- My agency is responsible for about 2/3 of this effort.
- As many of you know, in the early years of a new technology, an industry can live and die based on the availability of government support.

- One only has to look at the history of wind development to see the start-stop nature of a business that has been dependent on a tax credit regime that has been more intermittent than the resource it was supporting.
- We wanted to avoid that situation with the solar industry, and thus are committed to providing support, via ratepayer incentives, for a ten year period.
- We believe this kind of commitment will provide industry and the financial community with the certainty that is required to support long-term investments in this area.
- As with previous programs, the CSI lays out a schedule of declining incentives on the premise that the industry can be weaned off of government support as costs come down.
- However the incentive reductions we adopted in the CSI are unique in that they are triggered by the volume of capacity that has been installed, rather than by the passage of time.
- We believe this approach is more consistent with the way in which markets evolve;
 - Technology costs decline as a function of industry experience and scale.
 - This is better measured through the capacity that has been installed, rather than through arbitrary dates on a

calendar, which may have no connection to the degree of industry evolution.

- Another element of the CSI that represents a substantial change from prior efforts in California to support solar development is the explicit consideration of performance in determining the incentives a system is eligible to receive.
 - In the case of large systems, incentive payments are made on a per kWh basis, over a five year period, using actual metered production.
 - For smaller systems, although the incentive is still paid out on a capacity basis, the actual per-watt payment a system is eligible to receive is adjusted to reflect estimated performance.
 - We believe this approach will focus system owners' and installers' attention on improved system design and location.

❖ **THE RENEWABLE PORTFOLIO STANDARD**

- Another critical policy is the Renewables Portfolio Standard or "RPS", which requires our load serving entities, with the notable exception of the municipal utilities, to meet at least 20% of their load with renewable resources by 2010.

- In addition, there is proposed legislation that would expand the RPS program to 33% by 2020.
 - This would make an already aggressive target even more ambitious, and so we are looking to out-of-state possibilities for renewable development.
 - We recently authorized PG&E to evaluate the feasibility of developing renewables in British Columbia, which has one of the highest quality wind resources on the planet.
 - Currently, at least on a contractual basis, we appear to be on track to achieve the 20% goal in 2010.
 - However, energy contracted is different from energy delivered and so we have taken great pains to ensure that these contracts are truly viable through extensive oversight of the contracting process.
- Although 21 states have RPS programs, there are several unique features to the California RPS that are worth pointing out.
 - As established in state law, the California RPS limits the above market cost of achieving the goals of the program through a two-stage contract approval process.
 - In the first stage, contracts, emerging out of an annual solicitation, are submitted to the CPUC for approval.

- If these contracts are priced at or below a benchmark price, or “market price referent”, the contract price can be rolled into electricity rates.
- However, if the contract is above the referent price, another application must be submitted to our sister agency, the California Energy Commission, for approval of the above market costs.
- These are paid for separately out of a fund that ratepayers contribute to via a public purpose surcharge on their bills.
- Because the obligation to purchase renewable energy extends only as long as there is sufficient funding to cover the above market costs, the size of this fund limits the total amount of renewable energy that will ultimately be purchased.
- This represents a real challenge to investment in renewable generation.
- First, any two-stage approval process imposes some regulatory risk and overhead that would not otherwise exist.
- More problematic still, we have heard repeatedly that investors are reluctant to finance projects where at least part of the contract depends on a government fund that remains subject to so-called appropriations risk.

- Furthermore, as we move up the supply curve, it is unclear if the size of the above-market funding will be sufficient to cover the aggregate cost of achieving the RPS goals.
- All of these issues pose a substantial barrier to the development of those technologies, like concentrating solar, that offer great promise, but could require above market payments.
- We are currently seeking to amend the state law governing the RPS program to eliminate the two stage approval process, consolidating approval within the CPUC.
 - This change would also get rid of the separate payment stream to cover the above-market costs of renewables, and simply allow the CPUC to authorize recovery through rates.
 - However it would leave intact the aggregate above-market costs that can be paid to RPS contracts to an amount consistent with the size of the existing fund.
- The absence of REC trading represents another aspect of our program that differs from those in many other states
 - For those of you unfamiliar with RECs, or “Renewable Energy Certificates”, they represent claim environmental

attributes, and thus the RPS compliance value, of renewable generation.

- Many RPS regimes allow entities to purchase “unbundled” RECs rather than actually requiring them to take ownership of the underlying energy itself.
 - Thus a renewable generator could sell its energy to one entity and the renewable attributes associated with this energy to another.
 - Theoretically, there are a number of efficiencies that could be gained by allowing the renewable attributes to be unbundled and traded separately from the energy in this way.
 - Also, by creating a market for RECs, investors will be provided a much clearer indication of the value of the “green” in green energy, as separate from the value of the underlying energy itself, thereby fostering investment.
 - REC trading may also allow distributed resources, like residential or commercial solar applications, to capitalize on the green value of their generation by selling their RECs into the RPS compliance market.
- Although we don’t currently allow REC trading for RPS purposes in California, we are rapidly moving in that direction.

- My agency will soon be considering the extent to which unbundled RECs can be used for RPS compliance purposes.
- Furthermore, in the next month or so the Western Renewable Energy Generation Information System or “WREGIS” will become operational.
 - This system will track RECs produced by renewable facilities through a system of accounts, thus providing the basic infrastructure necessary for a REC market.
- The last aspect of the RPS program that I would like to touch upon relates to transmission.
 - Although California is blessed with an abundance of renewable energy resources, many of these are concentrated in areas far from load centers, requiring substantial investments in transmission.
 - For example, we recently approved the initial segments of a large transmission plan to access the wind-rich Tehachapi region.
 - When fully developed this region will provide approximately 4,500 MW of wind capacity to the California grid.

- Typically the up-front costs of transmission expansions to interconnect a resource to the grid are paid for by generators.
- In the context of renewable development this is problematic since the economic increment of capacity required to interconnect a resource area is likely to far exceed any individual generator's ability to pay.
- If generators in a region were able to collectively pay for transmission expansions, this problem would not exist, but the reality is that any resource rich area is likely to get built out over time and by multiple generators.
 - This negates the practicality of collective action.
- I am pleased to say that this problem seems poised to disappear thanks to a recent Declaratory Order by FERC.
- This order will allow the costs of renewable transmission facilities to be shared through transmission rates rather than placing undue burden on individual generators.
- This should remove a potentially significant hurdle to additional renewable development, particularly as we look further afield for renewable resources.

❖ **CARBON REGULATION AND AB32**

- The last area I'll discuss is California's carbon policy.

- As you may know, the CPUC's efforts with respect to carbon policy have been ongoing;
 - In 2004 we began looking into the costs and risks of climate change.
- Our first action was to adopt a "carbon adder" of \$8/ton of CO₂ to be factored into utility procurement decisions—for both supply- and demand-side resources.
- This was followed by the establishment of a "greenhouse gas performance standard",
 - First adopted in 2005 as a policy statement, this standard required all new, long-term investments in generation to be with resources whose greenhouse gas emissions are no greater than those of a combined cycle natural gas plant.
 - This was subsequently codified by the Legislature and extended to include the publicly owned utilities.
 - Let me highlight a few of the performance standard's key provisions:
 - This is a facility-based standard: individual generating units must each pass through its "gateway."
 - It applies to new ownership and contractual commitments of 5 or more years with base-load facilities.

- It encompasses major refurbishments and contract renewals with existing facilities.
 - The “gateway” level of emissions is set at 1100 lbs of CO₂ per MWh.
 - The order pre-qualifies certain renewable technologies, and provides a process for plants using other technologies to pass through this “gateway”, conceivably including “clean coal” facilities that sequester their carbon emissions.
- The performance standard, as well as the carbon adder, represents initial forays into managing GHG emissions from the electricity sector.
 - With the passage of AB32 we are entering into an entirely new era of carbon regulation.
 - This landmark legislation, signed into law by Governor Schwarzenegger last year, requires California’s total GHG emissions to be reduced to 1990 levels by 2020 through the establishment of a multi-sector cap.
- The legislation tasks the California Air Resources Board with:
 - developing the overall plan to achieve the emissions target;

- and designing an emissions trading system to complement other regulations.
- My agency is now working closely with the Energy Commission to develop recommendations to ARB on how to implement AB32 for the electric and gas industries.
 - The implementation plan will combine the new trading system with existing mandates, like our energy efficiency programs and renewable portfolio standard.
 - We must also determine how the load-based electric sector cap will be integrated into the multi-sector system being developed by ARB.
 - Our policy recommendations will be incorporated into a scoping document that presents ARB's overall plan for realizing AB32's statewide target.
 - The scoping document must be voted on by the ARB by the end of next year.
- As currently envisioned the cap on the electricity sector will be "load-based", under which the utilities' CO2 emissions will be measured on the basis of the portfolio of resources they use to serve load.
 - This has the advantage of including the emissions generated from out-of-state facilities that deliver into California.

- This is viewed as an important advantage of the load-based cap compared to a generator-based cap, especially in an environment where nearby states have not, as of yet, implemented carbon regulation.
 - Since California only has jurisdiction over entities within its borders, a generator-based approach has a higher risk of “leakage”, whereby dirty generators would simply relocate out-of-state, and deliver their energy in-state.
 - More practically, out-of-state generators, while accounting for about 30% of the electricity used in California, account for over 50% of the electricity sector’s GHG emissions, making it clear that for our carbon policy to have any meaningful impact, these generators must be included.
- One question that has been raised is whether a cap obviates the need for technology-centric mandates like the solar or renewables programs that I described earlier.
- Indeed the point of a cap & trade regime is to let market forces determine the best way of reducing emissions.
 - I have no doubt that over the long-term a cap will provide the appropriate incentives for technological innovation.
 - However, in the near to mid-term, I am concerned that even at extremely high carbon prices, some of the most

promising clean energy technologies will not be cost-competitive with conventional generation.

- Eventually, when we have a national cap and trade system, carbon prices may rise high enough to tip the balance.
- But we can't afford to wait for that day to begin investing in the no- and low-carbon technologies that will enable us to cut greenhouse gas emissions dramatically.
- This is especially true in the energy industries, where the infrastructure lasts for decades: today's investment decisions lock in tomorrow's emissions.
- So we must do all we can to ensure that clean energy technologies enter and move through the pipeline as quickly as possible.
- Targeted public subsidies must supplement private sector investment in research, development and demonstration of promising new technologies.
- And programs like the California Solar Initiative and the Renewables Portfolio Standard need to be implemented to ensure these technologies get to scale.

❖ CONCLUSION

- The reality of climate change is no longer in doubt, and the consequences of inaction are dire:
 - The latest study from the UN's Intergovernmental Panel on Climate Change projects that global warming will result in human suffering and displacement on a vast scale. Within just a few decades we could see:
 - Hundreds of millions in Africa and Latin America without enough water;
 - Tens of millions flooded out of their homes each year due to rising seas; and
 - Soaring death rates from malaria, malnutrition and other global-warming related illnesses.
- As the 12th largest emitter of GHG emissions in the world, it is clear that California has a responsibility to mitigate its carbon footprint.
- As I hope my remarks have made clear, we are actively working to create a regulatory environment in California that provides the incentives necessary to overcome what I see as one of the defining challenges of our times.

Let me close with this observation:

- When you look at carbon intensity by citizen, an account for GNP, the US ranks in the middle, above such countries as

China, India and Mexico, but well below many others ----
this, in part, is a reflection of Bush, etc.

- But, then look at California alone, it ranks with Japan, France and Denmark.
- If the US had adopted California's EE and RPS standards 30 years ago, we would have 250,000 fewer MW of power plants (mostly coal).
- The California standard of living has not suffered. We are essentially much more EU like, which is why Governor Schwarzenegger signed an agreement with Tony Blair.
- Now 5 states and BC have agreed on GHG, etc. This is the future. We can have a better environment and a prosperous economy! That's the California story.

For more information on the California Story, please visit our website at: <http://www.cpuc.ca.gov/eeworkshop/CPUC-new/design/cleanenergy.html>