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Docket UE-200115

Jeff P Jordan

Public Comments

In my Petition for Interlocutory Review of Denial of My Late Filed Petition to Intervene, I included a summary of the argument for the valuation of the Colstrip Transmission System (CTS) based on its highest and best use based on the following:

A) 5000 MW of coal generation in the NW Power Pool is retiring by 2025.

B) Northwest wind and solar cannot be used to replace retiring winter baseload coal generation.

C) Prudence suggests planning now for 3000 to 4000 MW of new natural gas generation to be fully on-line by November of 2025 to operate primarily in winter months as needed.

D) 7000 MW (nameplate) of Eastern Montana Wind could replace 3000 MW of winter baseload coal generation. This would require 7000 MW of transmission capacity.

E) The existing Colstrip Transmission System (CTS) and continuing BPA segments, converted to high-voltage, direct-current transmission (HVDC), could offer 7000 MW of transmission capacity in Phase I and 7000 MW of firm clean power in Phase II.

F) The existing CTS requires a specialized large generator to start-up and stabilize the operation of the power lines, particularly when co-transmitting with variable output wind.

G) Only Colstrip 4 will be operating after 2023, so if Colstrip 4 goes down, the CTS goes down and cannot transmit wind power or anything else.

H) Colstrip 4 has a significant boiler problem, so may not last until 2025, let alone 2027.

I) HVDC can start up with wind power and can be used to stabilize the connected AC grid, so would provide eliminate CTS dependence on Colstrip 4.

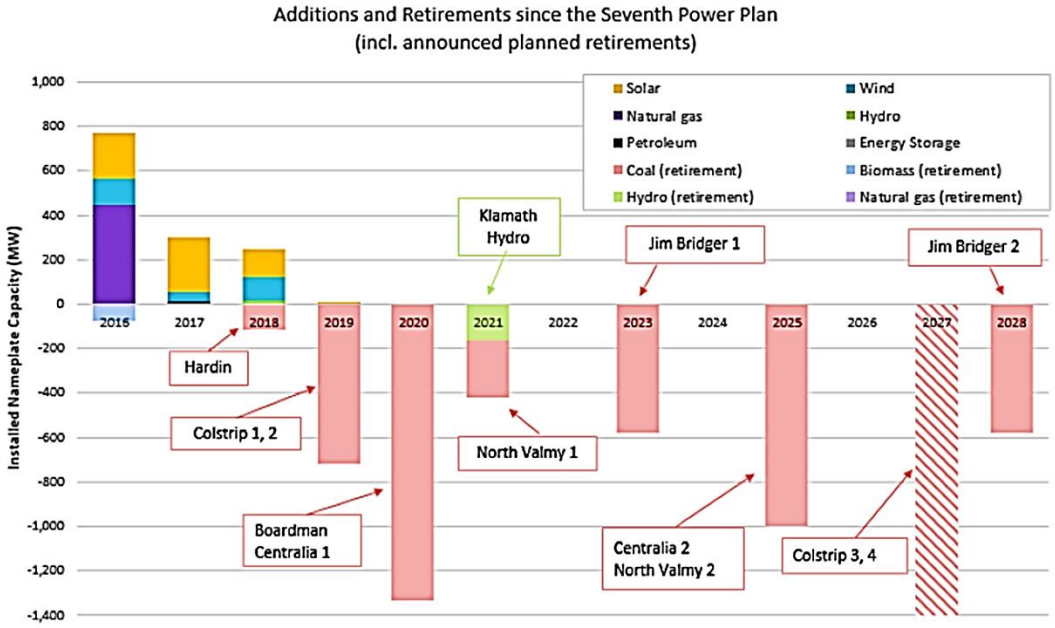
Parts of the supporting argument for the above is now most useful in this Docket as a footnote to the **PREFILED DIRECT TESTIMONY OF EZRA D. HAUSMAN, PH.D. ON BEHALF OF THE SIERRA CLUB** under his section VI:

"VI. Transmission Sale Also Likely a Bad Deal for PSE Ratepayers . . .

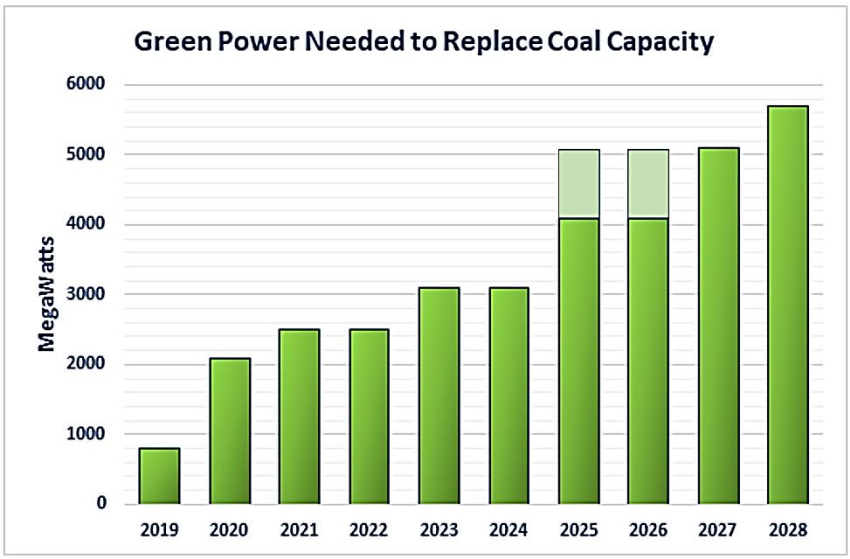
> "Q. Do you agree that the depreciated net book value is a reasonable proxy for the market value of these assets?
>
> "A. No. The depreciated net book value is an accounting construct for purposes of tracking recovery of PSE's investment(s) in the asset and is independent of the current market value.
>
> "Q. What is a better way to establish a market value for an asset like the Colstrip Transmission System?
>
> "A. There are a number of approaches that could be taken. First, PSE could have put out a request for bids to purchase the asset, and established if there were, in fact, other potential buyers, and what they would be willing to pay. Second, PSE could have established what the replacement cost would be for the assets – in other words, what it would cost to build them today. Third, PSE could have estimated the future revenues that the assets are likely to generate, along with future operating costs, and used a discounted cash flow model to establish the value of the assets."

I suggest the Commission act in the public interest to require PSE and other utilities in Washington to value the Colstrip Transmission System by estimating future cash flows based on the HVDC-conversion option, which is outlined above and further supported below.

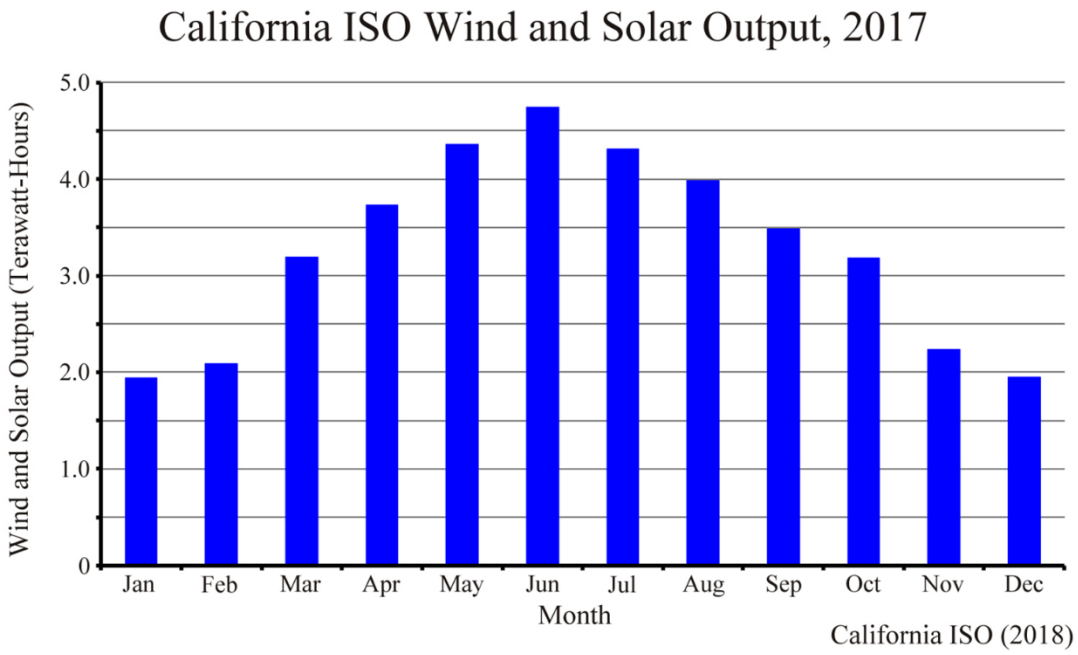
A) 5000 MW of coal generation in the NW Power Pool is retiring by 2025.



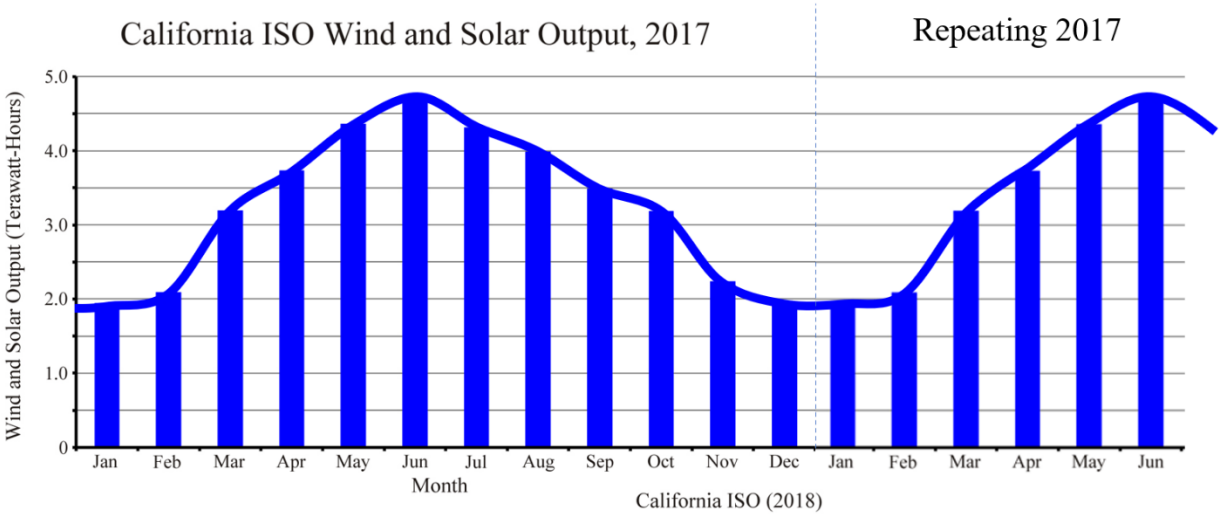
Below is the Cumulative Total of Coal Capacity to be replaced based on the above from a Gillian Charles presentation in November 2019.

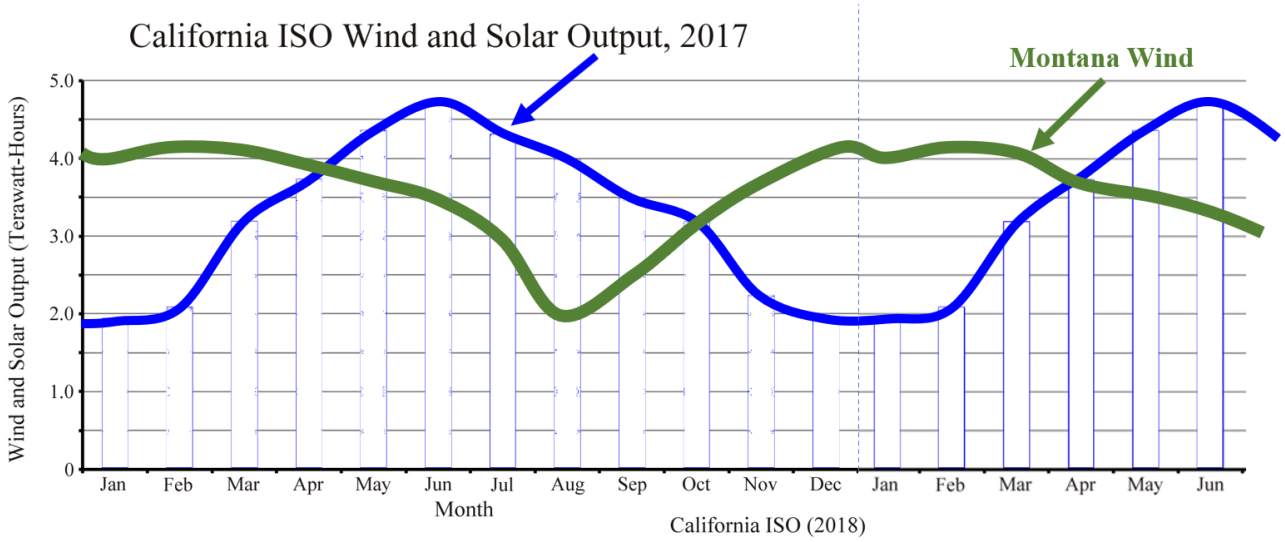


B) Northwest wind and solar cannot be used to replace retiring winter baseload coal generation.



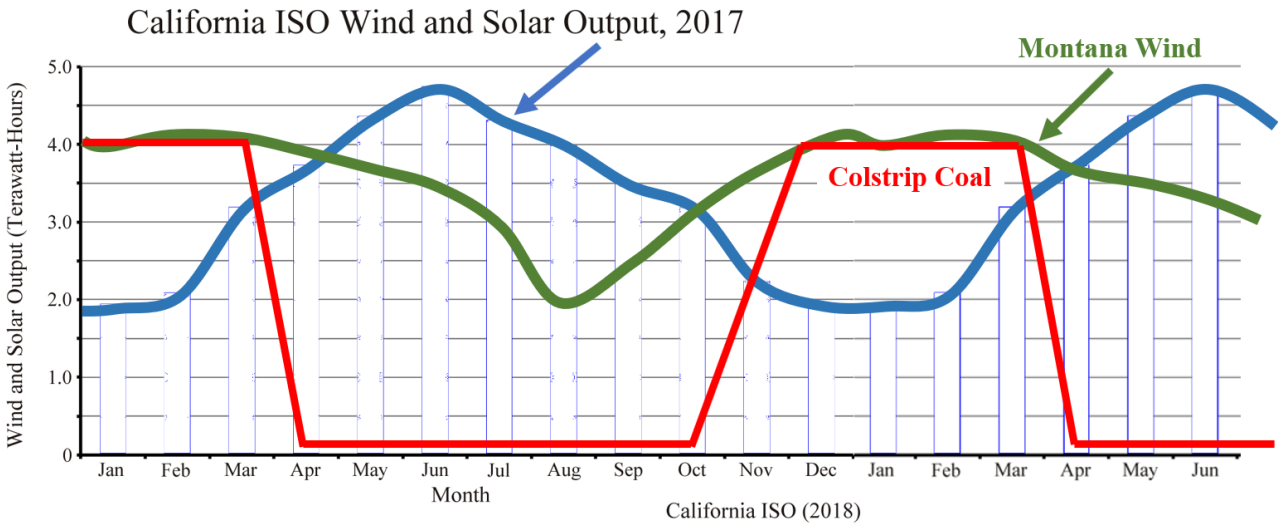
The above was published on the California ISO website. Below, the first six months are copied and pasted onto the end to emphasize the lack of production in the winter.





Above the approximate Montana Wind output is added to show the more favorable winter capacity relative to Westcoast wind and solar.

Below the approximate Colstrip Coal output is shown as it fills the winter gap in wind and solar production. This is increasingly the only niche left to coal in free market energy and capacity pricing because coal can no longer compete with wind, solar, or hydro, when they are naturally available. Note that Montana Wind can totally replace coal, because it is much less expensive and available in the winter.

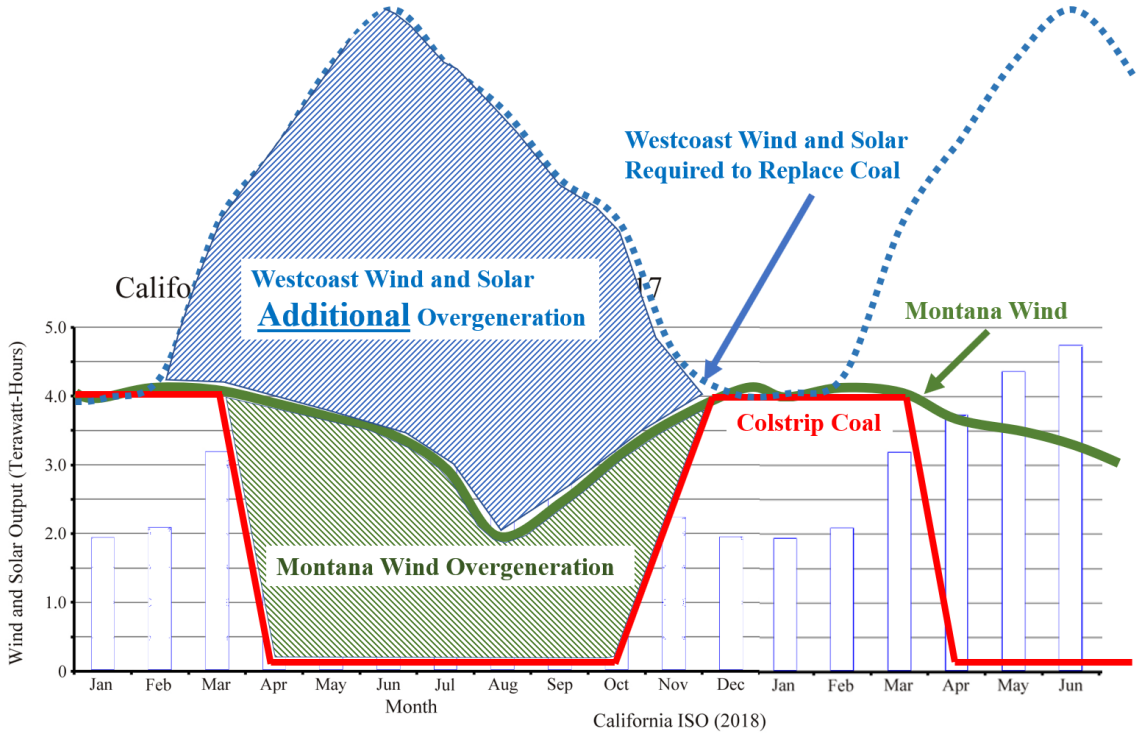


Below is the rough approximation of the results of just buying enough Westcoast wind and solar capacity to replace coal, relying on BPA hydro to smooth out the week to week variations, which require about 4x more BPA hydro variation as Montana Wind.

This also offers a picture of the overgeneration problems. Overgeneration is the power output available that there is no use for, due to the stable market condition that this new power is coming in on top of.

The Montana Wind Overgeneration is coming in on top of a niche that wind, solar and gas generation have filled, partly at the expense of coal. The Montana plan will have to deal with it.

The Westcoast Wind and Solar plan has to deal with BOTH the Montana Wind Overgeneration and the West Coast Wind and Solar Additional Overgeneration.



C) Prudence suggests planning now for 3000 to 4000 MW of new natural gas generation to be fully on-line by November of 2025 to operate primarily in winter months as needed.

The Overgeneration problems defined above could be managed by a combination of solutions:

1. Curtail natural gas production to allow the use of all available wind and solar power.
2. Curtail wind and solar production to honor existing natural gas power contracts.
3. Curtail more BPA hydro power by spilling more water.
4. Invest in hydrogen generation in summer and storage to generate power in winter.

Other than 2, all of the above would probably require years of legislative, regulatory, and judicial action**.**

Solution 2 would require curtailment of all of the green-hatched and all of the blue-hatched area above, so would discourage investment in the essential wind and solar resources.

Because coal power plants are closing increasingly rapidly for economic reasons, the NW Power Pool may require 5000 MW of new winter power capacity before 2025. New gas generation seems to be the only option in the time available for avoiding winter power capacity shortages in the coming years.

Benton PUD has made a detailed case for a similar point of view in their July 14, 2020 ***Wind Power and Clean Energy Policy Perspectives.*** This is a quote from their Executive Summary:

> "… development of wind power in the PNW will not result in consequential reductions in national or global GHG emissions attributable to Washington State utilities and will do very little to mitigate the increasing risk of northwest power grid blackouts; which could grow to a 26% probability by 2026 if utilities are unable to replace the reliable generating capacity of shuttered coal plants."

https://www.bentonpud.org/getattachment/Safety-Education/Safety/Wind/Wind-Power-and-Clean-Energy-Policy-Perspectives-Report-Benton-PUD-FINAL-July-14-2020-(1).PDF.aspx?lang=en-US

D) 7000 MW (nameplate) of Eastern Montana Wind could replace 3000 MW of winter baseload coal generation. This would require 7000 MW of transmission capacity.

This is based on about 43% winter capacity factor for 80m turbine height in Eastern Montana: 7000 MW x 0.43 = 3010 MW. Higher, bigger turbines have higher capacity factors, but the construction and maintenance is still being worked out.

E) The existing Colstrip Transmission System (CTS) and continuing BPA segments, converted to high-voltage, direct-current transmission (HVDC), could offer 7000 MW of transmission capacity in Phase I and 7000 MW of firm clean power in Phase II.

The following is the latest technical paper, which references most of the preceding literature:

Converting existing transmission corridors to HVDC is an overlooked option for increasing transmission capacity

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Edited by Peter D. Blair, National Academy of Sciences, Washington, DC, and accepted by Editorial Board Member Susan Hanson May 21, 2019 (received for review April 15, 2019)

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". . . While typically not included in planning tools, such (HVDC) conversion is surprisingly cost-effective, even over relatively short distances, and, in some cases, may be the only way to achieve dramatic increases in the capacity of existing corridors. . . ."

F) The existing CTS requires a specialized large generator to start-up and stabilize the operation of the power lines, particularly when co-transmitting with variable output wind.

The best reference I found on this subject is

"Repurposing the Colstrip Transmission System" by Charles A. Stigers, January 1, 2018.

Commissioned by Renewable Northwest "*A white paper explaining the transmission questions that arise when considering the retirement of coal fired generation facilities and the addition of new renewable resources on the Colstrip Transmission System."*

In discussing Scenario 3, in which Colstrip 1,2,3, and 4 are shut down, Mr. Stigers notes:

> "Restarting a large AC power network when most of the resources are wind powered machines with inverters that rely on a stable system with a well-regulated frequency will require a stable voltage source. Conventional generators in eastern Montana can provide some start-up. NorthWestern Energy will need to conduct a "black start study" to confirm this is enough."

G) Only Colstrip 4 will be operating after 2023, so if Colstrip 4 goes down, the CTS goes down and cannot transmit wind power or anything else.

As Mr. Stigers notes on page iv:

> "In general, none of the above scenarios pose a problem that is known to be insurmountable, but all of them require some amount of additional study work and engineering to design the necessary system reinforcements to achieve completely reliable operations. The additional studies that need to be completed include: 1) examining all single and double contingencies on the CTS with power flow, post-transient power flow and dynamic studies; 2) RAS design and approval (1-3 years) 3) Path Rating approval through the standard WECC process (1-2 years). A reasonable expectation for the amount of time it will take to conduct these studies and receive the necessary regulatory approvals is 1-3 years depending upon the available resources to complete the work."

I note that a firm design scenario is essential to starting the engineering. After the engineering work is completed to the satisfaction of all parties, then review (and possible revision) processes take 1-3 years, then custom equipment must be ordered, then must be installed, tested, …

At the moment, the design scenario is still uncertain.

H) Colstrip 4 has a significant boiler problem, so may not last until 2025, let alone 2027.

This and Staff's recommendation that the three partners serving Washington do not pay any part of the $20+ million price tag have been widely reported in the press.

I) HVDC can start up with wind power and can be used to stabilize the connected AC grid on both ends, so would eliminate CTS dependence on Colstrip 4.

I believe it would be easier and faster to convert the CTS to HVDC, because removing it from the HVAC grid would both make the grid more stable, the CTS more stable, and eliminate HVAC problems/complications with variable wind power transmission.

Elements of The Grand Bargain to Make It Happen

- Montana/Northern Cheyanne get more green jobs for the long term.
- Northwestern Energy (NWE) gets more power capacity and $$$.
- Colstrip Partners get wind power to replace coal power and $$$.
- BPA can provide the greatest good for greatest number and $$$.
- Washington gets clearer path to clean power to replace coal.
- NW and US get demonstration of straightest path to a “Smart Grid”.
- A win-win-win situation for all parties essential to the project.