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FutureGrid | BC's Energy Options in a Changing Environment

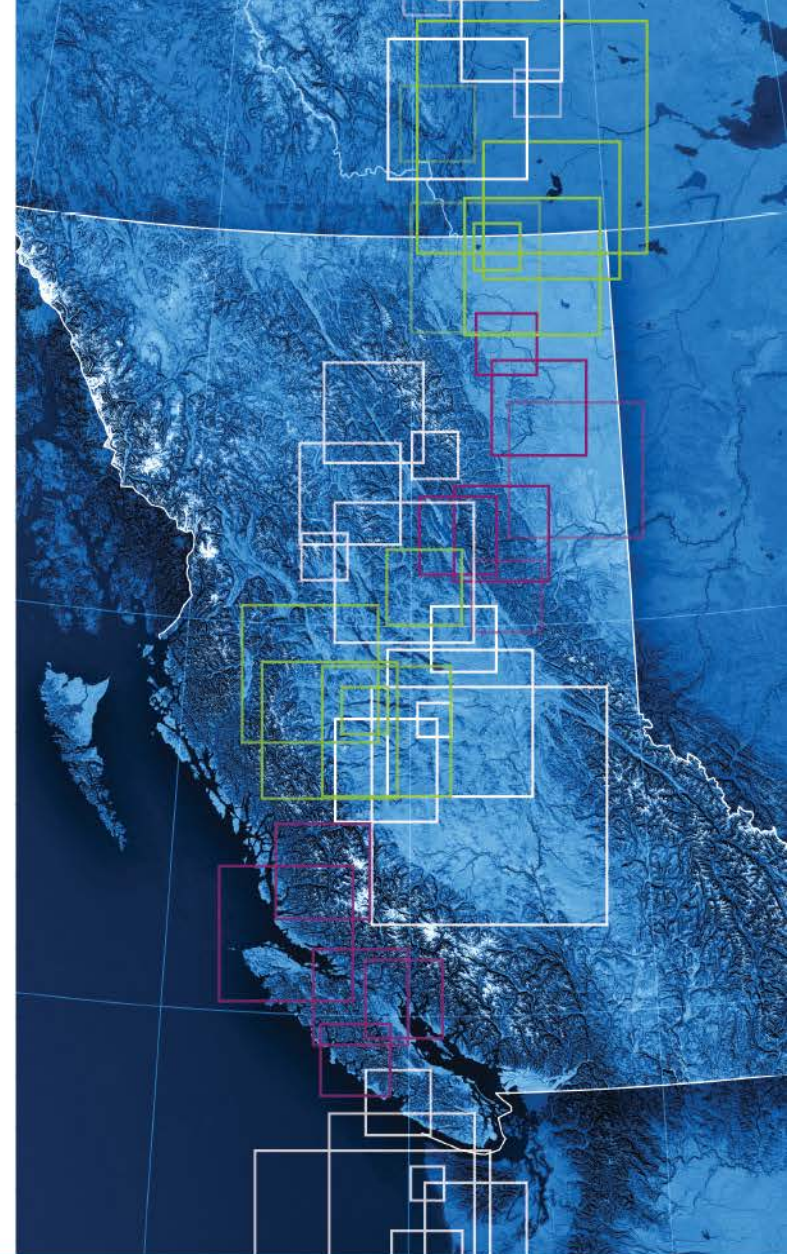
JPAC Panel Discussion

California's RPS and BC: A Policy Disconnect?

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University
of Victoria



SIMON FRASER UNIVERSITY
THINKING OF THE WORLD



THE UNIVERSITY OF BRITISH COLUMBIA



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NORTHERN BRITISH COLUMBIA



An Energy Parable

California emission standards circa 1970

Engine manufacturer solution: Catalytic converter

Problem: leaded fuels

Fuel manufacturer solution: Unleaded fuels

Engine manufacture response: Reduced engine CR

Overall result: Increased petroleum consumption





Impacts

Impacts of small hydro project = Q_i

Cumulative impact = $Q_1 + Q_2 + Q_3 + \dots$ Linear ?

Cumulative impact = $f(Q_1, Q_2, Q_3, \dots)$ Non-linear ?



Or

40 X 30 MW ?





Impacts

“Using wind turbines to meet 10% or more of global energy demand in 2100, could cause surface warming exceeding 1 degree C over land installations..”

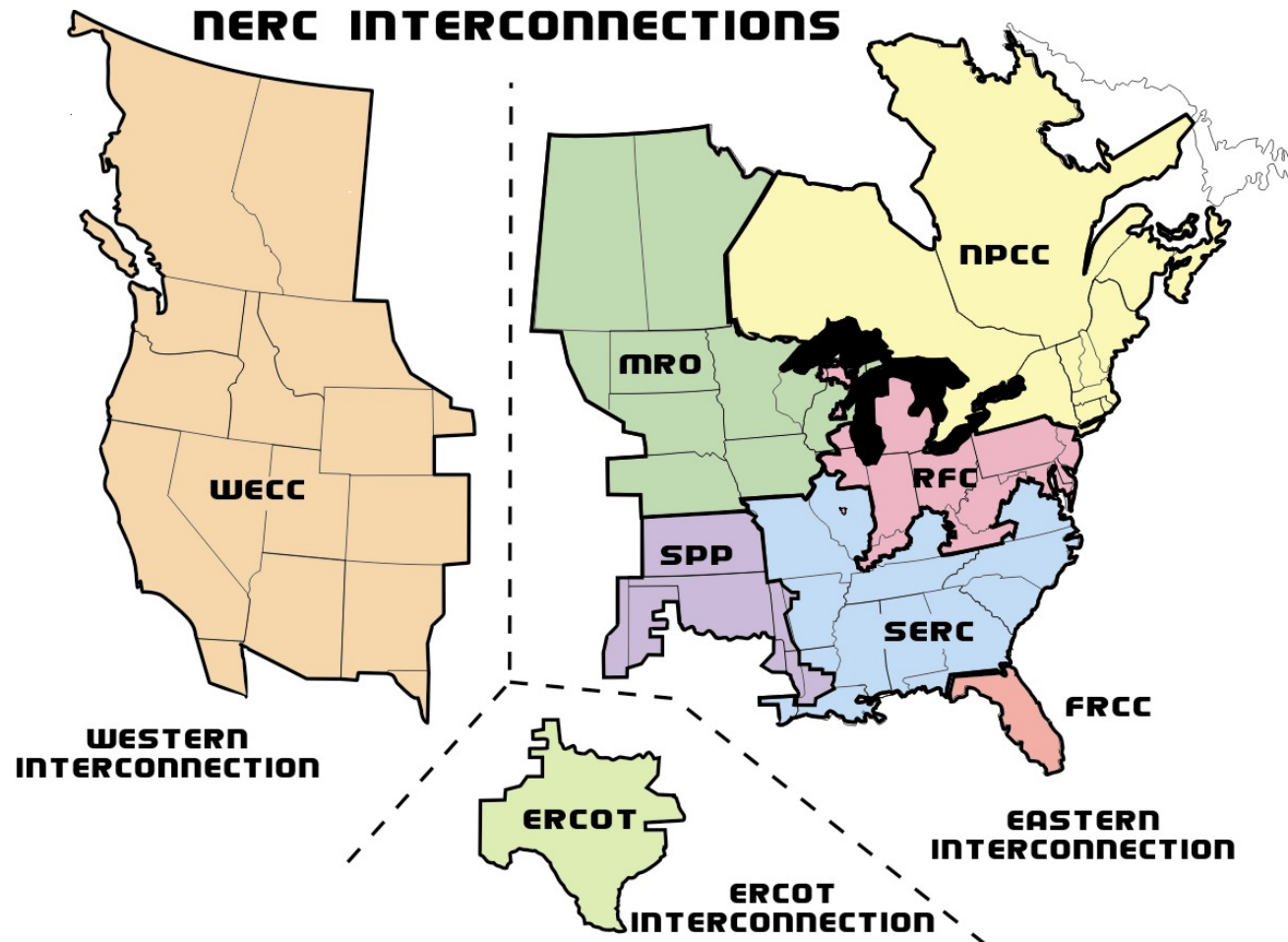
Wang and Prinn, Potential climatic impacts and reliability of very large-scale wind farms; *Atmospheric Chemistry and Physics* **10**, 2010

Caution: Based on models





The System View





WECC(2007)

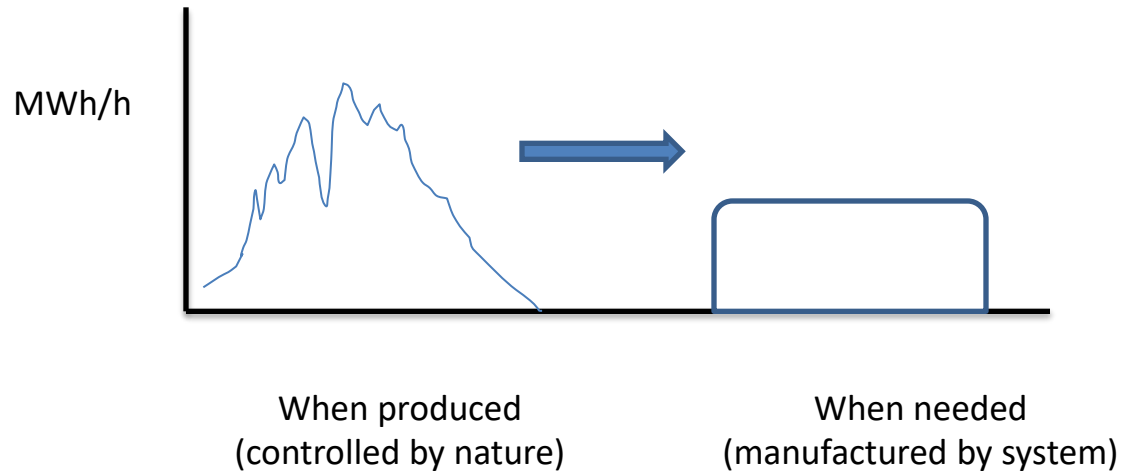
TWh

• Coal	247	35%
• Hydro	188	27%
• Gas	156	22%
• Nuclear	74	11%
• Oil	2	< 1%
• Renewable	30	4%
• Total	697	(BC 72)





The System



Large-scale hydro can 'Firm and Shape' volatile renewable production

System impacts of volatile renewable production is a complex topic



Projections of future hydrologic regime for Pacific North America

Currently, in winter, on average, a temperature gradient is **MAXIMUM** near the latitude of Seattle. In the future however, this gradient will shift northwards so that Seattle and south will have fewer storms and less rain. To the north of Seattle, rainfall/snow will be larger. **ON AVERAGE.**

Caution: Based on models





Some suggestions to help answer the question

Keep an eye to unintended consequences?

Do we understand cumulative impacts?

Do we understand the system impacts of volatile renewables?

Is the goal renewable energy or low carbon-emissions energy?

Are we thinking about possible hydrological regime change?

