



Idaho's Collaborative Cloud Seeding Program

Senate Ag Committee

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February 25, 2025 Attachment 1



Our Service Area



More than
650,000
customers

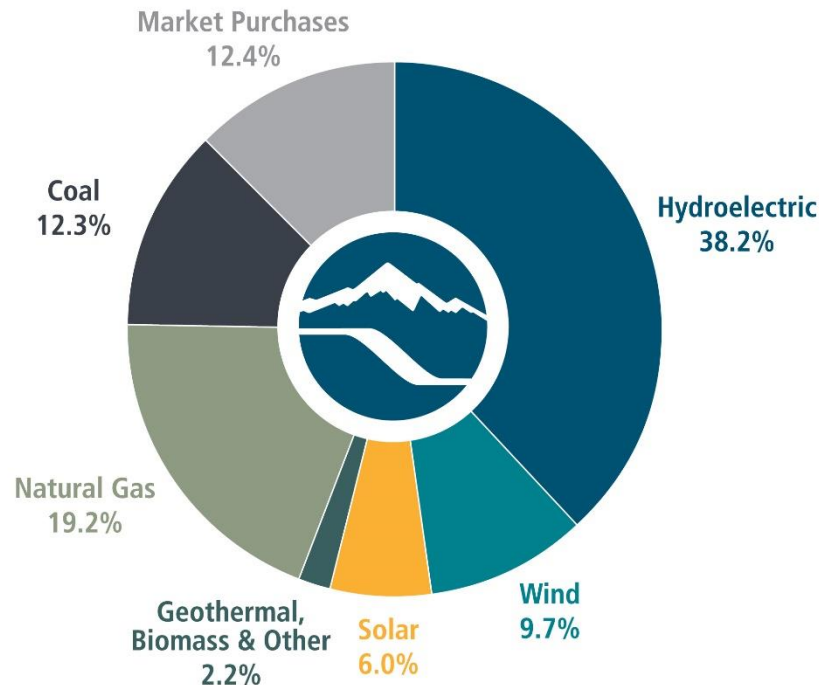
IDAHO
OREGON

- ◆ HYDROELECTRIC FACILITIES
- NATURAL GAS FACILITIES
- ▲ THERMAL FACILITIES
- ▼ DIESEL FACILITIES
- BATTERY STORAGE



Clean Energy

2024 Energy Mix



This shows the energy we generate from company-owned resources and energy we buy through long-term contracts with wind, solar, biomass, geothermal and small-scale hydro generators.

The mix does not represent the energy delivered to customers for two reasons.

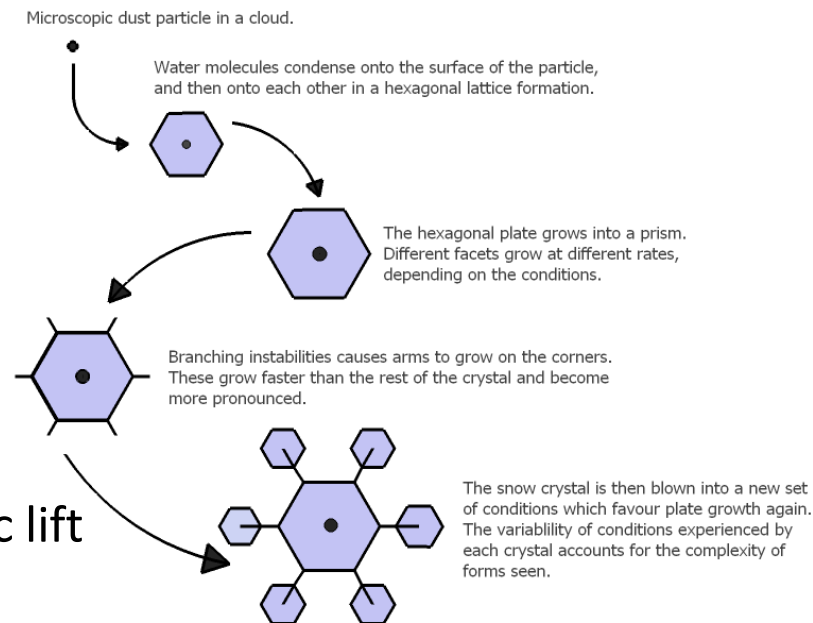
- We participate in the wholesale energy market and sell energy to other utilities and to retail customers.
- Some of our purchased power from renewable sources comes with a Renewable Energy Credit, or REC, which we sell to keep customer prices low.

Cloud Seeding as a Water Management Tool



What is Cloud Seeding?

- Cloud seeding depends upon an **abundance of super cooled liquid (SLW) water** in the atmosphere
- Cloud seeding provides **additional efficient ice nuclei**
 - Silver Iodide released into the atmosphere creates additional ice nuclei
 - Allowing the formation of ice
- Cloud seeding has been used as:
 - Fog suppression
 - Hail suppression
 - Rainfall enhancement
 - **Snowpack enhancement**
- Snowpack enhancement utilizing orographic lift



Why Cloud Seed?

State Benefits of Additional Water Supply

- Greater reliability for storage and natural flow water users
- Higher reservoir carryover from year to year
- Water quality
- Improved fisheries conditions
 - Federal flow augmentation program
 - Resident fisheries
- Additional recreation opportunities
- Improved aquifer management through managed recharge and other activities
- Further supports low cost, clean hydropower
- Supports state economy and growth



Idaho Power's Cloud Seeding History

- Began investigating cloud seeding in 1993 (shareholder question)
 - Take home: Long-term water management tool
- Operational in fall of 2003 (7 generators, aircraft, assessment)
 - Completed second year of assessment and third year of operations in May 2005
- In 2008 collaborated with HC RC&D and E Idaho Counties to enhance their program 5-year pilot project under ESPA CAMP
- In 2010 started working with WW RC&D to evaluate cloud seeding opportunities in western Wyoming
- In 2011 started working with NCAR to develop WRF model to guide and evaluate CS operations and projects
- In 2013 – contracted with Big Wood Canal Company to seed Wood River with aircraft
- WY 2015 Expansion (44 generators, 2 aircraft)
 - Boise and Wood Basin's – remote generators and aircraft seeding
 - Continued expansion in Salt and Wyoming Ranges
 - IWRB funding a grant for equipment associated with expansion
 - Water users collaborative funding annual program Operations and Maintenance
- WY 2016 Expansion
 - Additional remote generators in Central Mountains and Upper Snake (Total of 53)
 - Third aircraft added
 - IWRB collaborative funding annual program Operations and Maintenance
- WY 2021 HB 266
- WY 2024 Expansion – Idaho Power adds liquid propane generators in the Payette Basin
- WY 2025 (Current)
 - Total 63 remote generators, 3 aircraft



Collaborative Partnership



Policy and Strategy

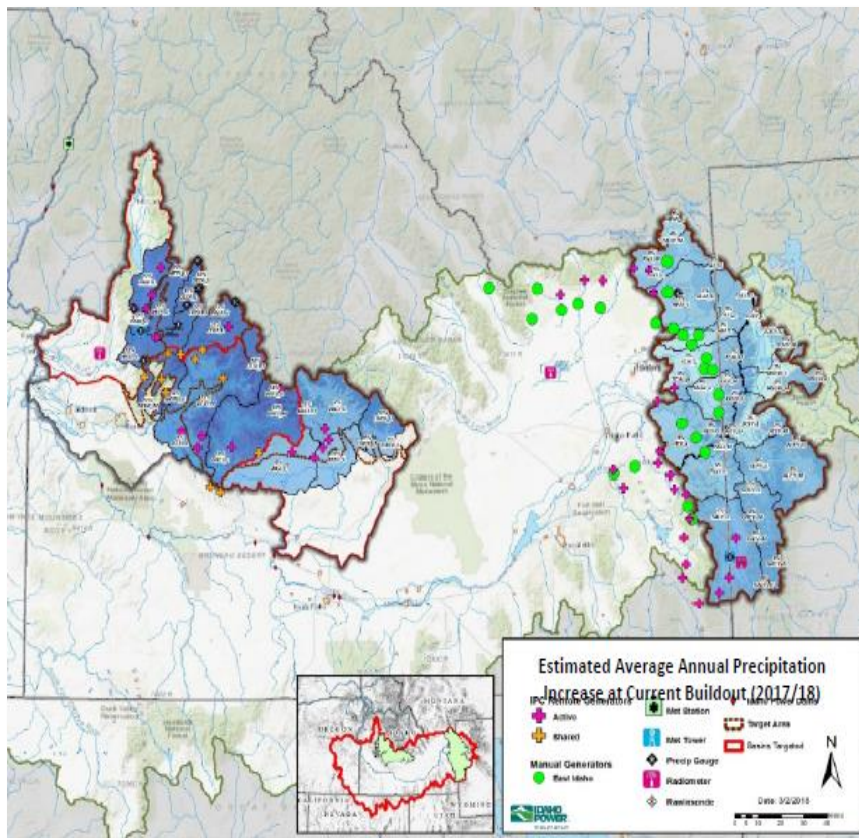


Technical



Financial

Annual Benefit Estimates



Average Annual Natural Flow Benefits

Boise Basin	239,000 acre-ft
Wood River Basin	101,000 acre-ft
Upper Snake Basin	613,000 acre-ft
Above Palisades	450,000 acre-ft
Henry's Fork	163,000 acre-ft
Payette (Idaho Power)	193,000 acre-ft

Total **1,147K acre-ft**

~\$4.10/acre-ft

Extra Area Effects

“Rob Peter to pay Paul”

Does increasing precipitation in a particular area decrease the amount of precipitation down range?

- Also referred to as Downwind/Down-range Effects
- Research has shown neutral or positive effects (more precipitation) from a well-run program
 - Solak et al. (2003) used a target/control regression approach and concluded positive benefits up to 200 km down range of the target area in central and southern Utah. The apparent limit to extra-area increases was 160-200 km.
 - North American Weather Consultants expanded on this work and found:
 - 14% increase in the target area
 - 14% increase 0-120 km east of the target area
 - 5% increase 120-240 km east of the target area

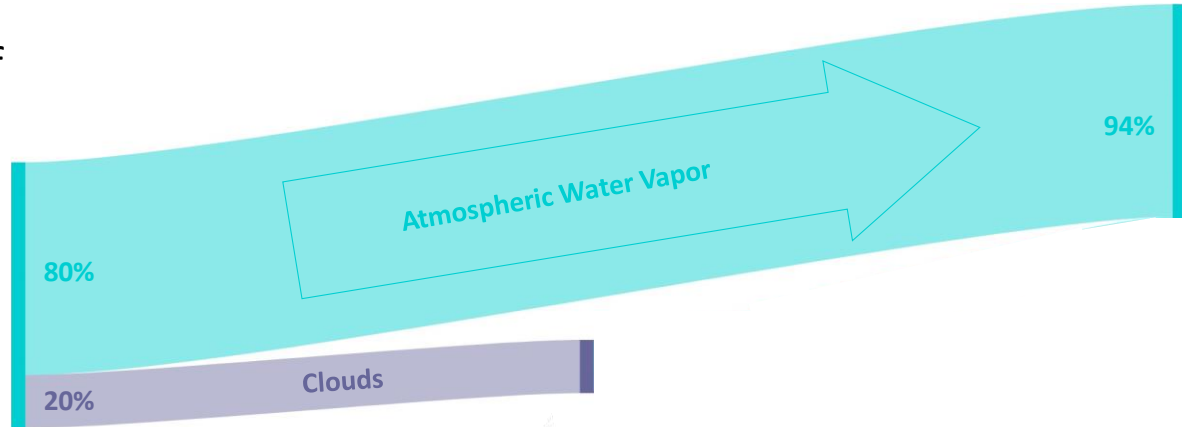


Extra Area Effects

To put quantities into context...

Nature will condense about 20% of the water vapor as moist air rises over a mountain barrier

- Remaining 80% remains uncondensed



Extra Area Effects

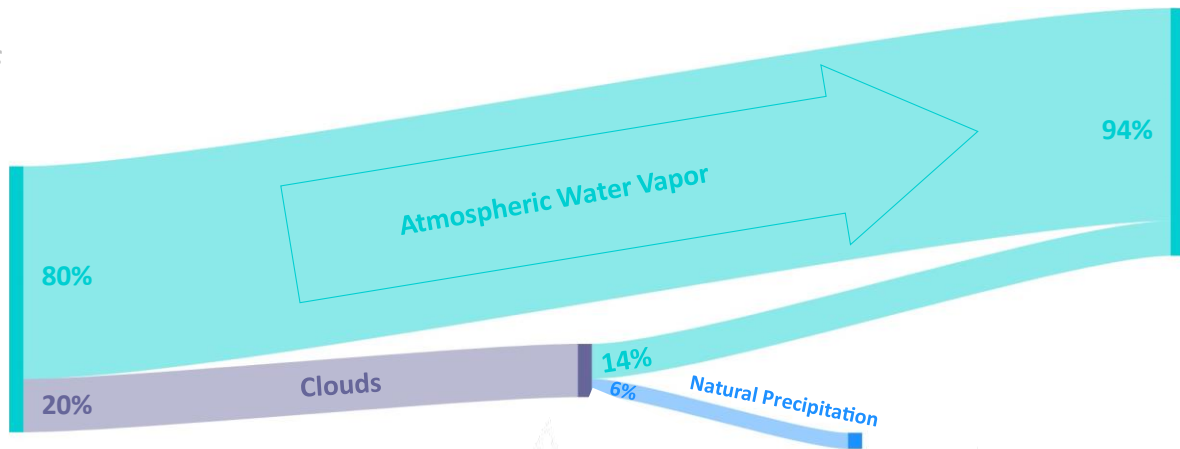
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Winter storms are typically about 30% efficient

- 30% of the 20% (6% of the total water) reaches the ground as precipitation



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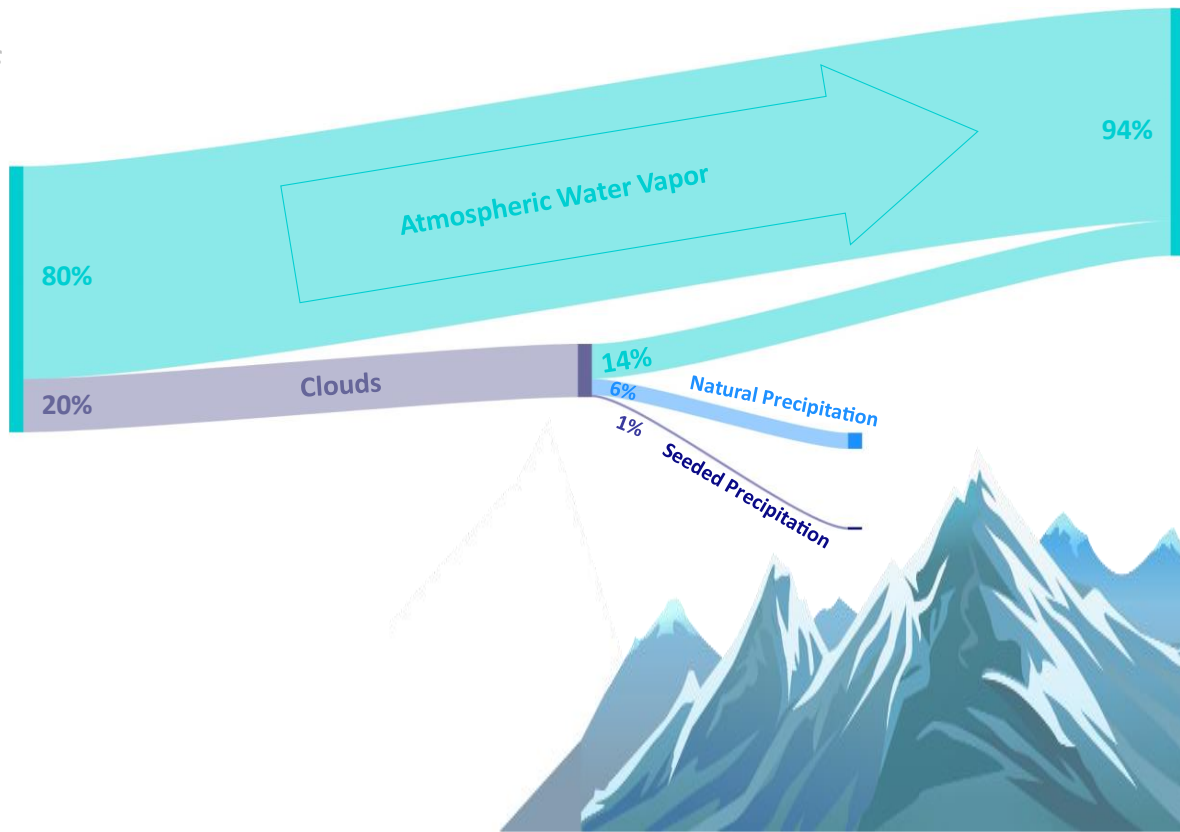
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Winter storms are typically about 30% efficient

- 30% of the 20% (6% of the total water) reaches the ground as precipitation

If cloud seeding increases precipitation 15%

- 15% of the 6% (0.9% of the total water) is the additional amount cloud seeding pulls from the atmosphere



Environmental Safety

The Weather Modification Association has issued a statement on toxicity of silver originating from cloud seeding:

- *“The published scientific literature clearly shows **no environmentally harmful effects** arising from cloud seeding with silver iodide aerosols have been observed; nor would they be expected to occur. Based on this work, the WMA finds that silver iodide is environmentally safe as it is currently being dispensed during cloud seeding programs.”*
- [EnvironmentalImpact.pdf \(weathermod.org\)](#)

Australia’s Natural Resource Commission reviewed Snowy Hydro’s seeded watershed and found no adverse environmental impact:

- *“Our review of Snowy Hydro’s analysis of data from its environmental monitoring over the first phase of the trial (2004 to 2009) found that it provides **no evidence that the trial has had adverse environmental impacts** over this period. **The analysis provides no evidence of accumulation of silver iodide or indium trioxide in sampled soils, sediment, potable water or moss in the areas being tested. It also provides no evidence of impacts on mountain riverine ecosystems or snow habitats.** In addition, it detected no difference between the concentrations of ammonia and nitrogen oxides in seeded and unseeded snow.”*
- <https://www.nrc.nsw.gov.au/accordion-content-main/publications-cloud-seeding>

Other Technical Documents:

- [Publications \(weathermod.org\)](#)

Environmental Safety

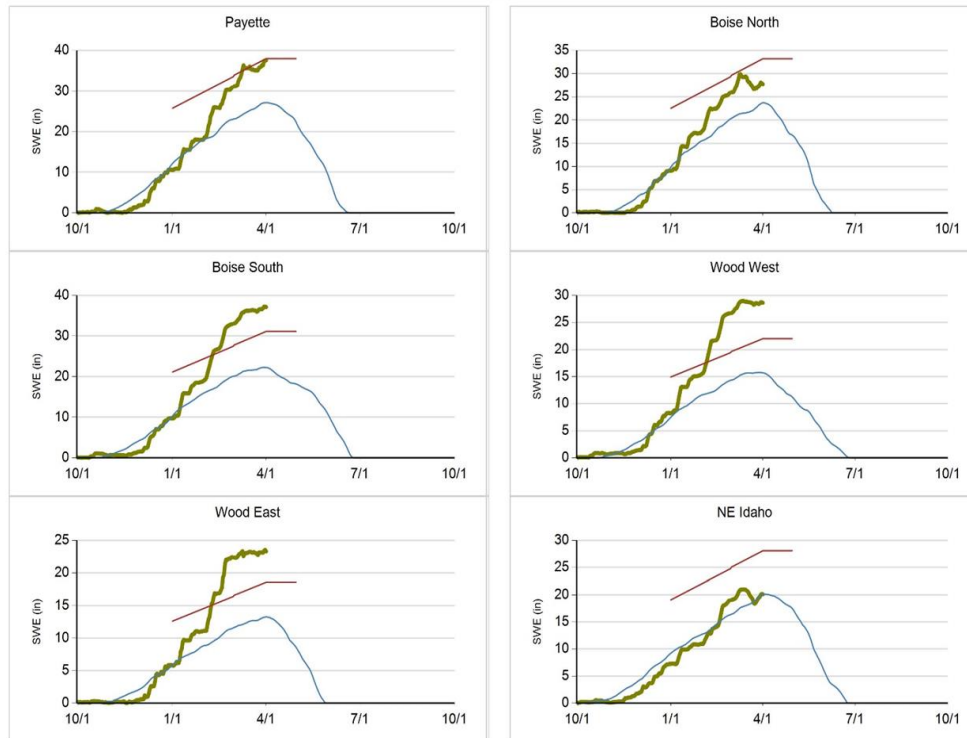
More than 20 comprehensive studies and data reviews of the environmental effect of the use of silver iodide for cloud seeding all concur that there is **no evidence of adverse effects to human health or the environment** from the use of silver iodide for cloud seeding.

- PG&E EA – 1995, 2006
- Snowy Hydro – 2004-2014, ongoing
- Williams and Denholm – 2009
- USBR Project SkyWater – 1977, 2009, 2013
- Cardno/Entrix Geochemistry and Impacts of Silver Iodide Use in Cloud Seeding (for PG&E) – 2011
- Santa Barbara County CEQA – 2013
- BSU and Heritage Environmental: Literature Review – 2015
- Sacramento Municipal Utility District – 2017
- State of Wyoming Level III Feasibility Study Laramie Range Siting and Design Final Report – 2017
- Placer County Water Agency CEQA – 2018

Suspension Criteria

Current Snowpack and Suspension Criteria

Current Water Year — Suspension — Median



- Well-designed and responsibly conducted cloud seeding programs include suspension criteria.
- Suspension criteria was a part of Idaho Power's original proposal to the Idaho Public Utilities Commission.
- Suspension criteria created in coordination with federal and state agencies and are reviewed and annually.

For example, suspension criteria for the Upper Snake were modified to incorporate reservoir conditions.

A nighttime photograph of a city skyline. On the left is a tall, rectangular building with many lit windows. In the center is a shorter building with a grid-like facade and a small tower on its roof. On the right is a very tall, modern skyscraper with blue and red neon lights around its top and a blue light on its spire. To the right of the skyscraper is the illuminated dome of the State Capitol building. The foreground is filled with dark trees.

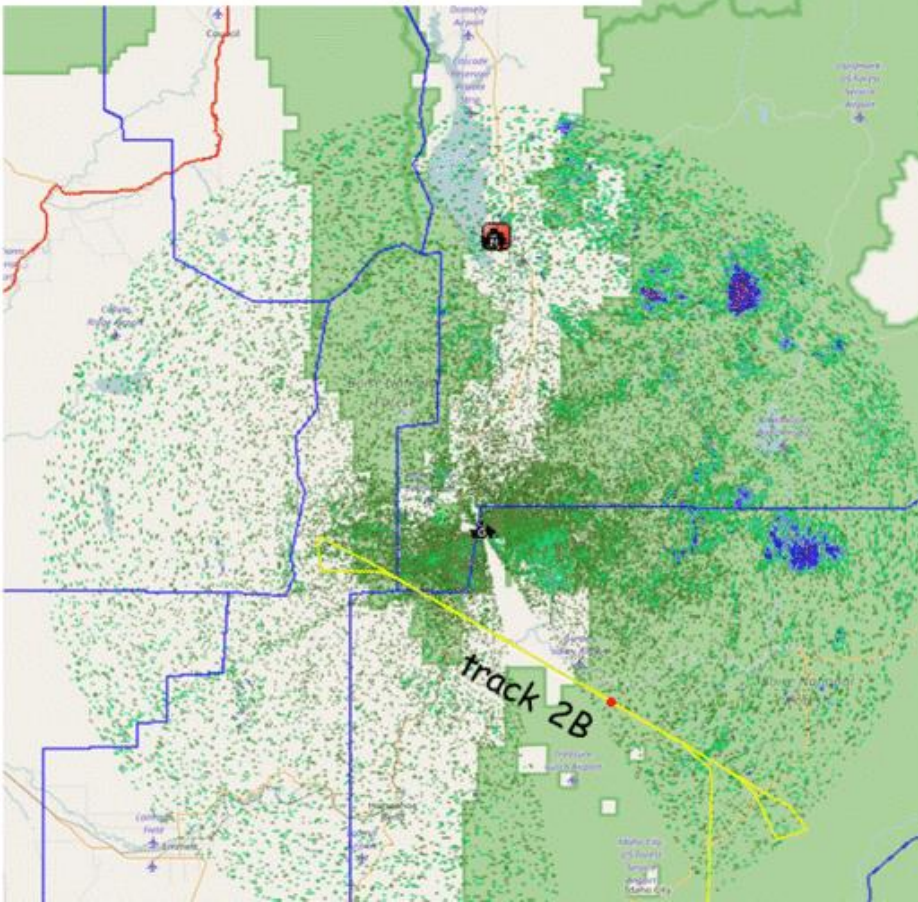
Energy Demand is Growing

DOW7-DBZ: 1.99952 deg 2017/01/20 00:24:45

19 Jan 2017

IDAHO POWER

DOW reflectivity + seeding aircraft track



Thank you!

A scenic winter landscape featuring snow-covered evergreen trees and a flowing stream. The scene is set in a forest with thick snow on the ground and trees. A stream flows through the center, surrounded by snow-covered banks and rocks. The overall atmosphere is peaceful and serene.

Thank you!