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Icelandic Hydroelectric Project Activated Amid Swirl of Environmentalist Protests

September 29, 2006 — By Krista Mahr, Associated Press

EGILSSTADIR, Iceland — Europe's highest concrete rockfill dam was activated Thursday in the remote eastern Icelandic highlands amid a swirl of protest from environmentalists. The Karahnjukar dam is part of a hydroelectric project constructed by national energy company Landsvirkjun to power an aluminum smelter being built by the aluminum producer Alcoa Inc. in eastern Iceland. In temperatures hovering just above freezing, the murky green waters of the glacial Jokulsa a Dal river came to a slow halt at around 0930GMT as workers sealed off two locks. It was the first step in creating what will ultimately become a 57 square kilometer (22 square mile) reservoir, flooding a swathe of the Icelandic highlands.

The project has been the subject of ongoing protests and calls to action by environmentalists in Iceland and abroad, including a peaceful protest march earlier this week in several of the nation's cities. Opponents of the dam and reservoir claim it will destroy wildlife habitats and is emblematic of Iceland making environmental and political sacrifices to attract the international aluminum industry. "This project is sacrificing a big slice of land that would have been an excellent national park. It was land that was untouched, but the politicians thought that untouched meant it was unpopular and invaluable," said Andri Snaer Magnason, author of the book "Dreamland, Self-Help for a Scared Nation."

The hydroelectric project involves the damming of two glacial rivers, forcing water to flow through a 72 kilometer (45 mile) tunnel system to a powerhouse where energy is expected be generated by April 2007.

Landsvirkjun said the US$1.5billion (euro1.18billion) investment to build the hydroelectric plant is the largest of its kind in Icelandic history. It will power Iceland's third aluminum smelter, but three more smelter projects are also under consideration around the country, including the expansion of an existing plant. "The dam is a small part of the grand scale aluminum revolution. The idea is to make Iceland the largest aluminum smelter in the world," said Magnason.

Supporters of the project believe the benefits that international investment will bring to Iceland outweigh the environmental loss. "There are many true nature lovers -- I am a true nature lover," said Sigurdur Arnalds, a spokesman for Landsvirkjun. "Some of those are not willing to make compromises that we sacrifice something for economic and social benefits.

Chapter 3 – Atmospheric Dispersion, Transport and Deposition

Important concepts

- Transport carries gases (e.g. pollutants) from one geographic (and altitude) region to another

- Pollutants initially released into the planetary boundary layer (PBL) are subject to the motions that are due to heating of the surface and exchange of water vapor (e.g. latent heat) – Note, the depth of this "PBL" is ~100-2000 meters

- Dispersion (i.e. the mixing of air with 'ambient', or background, air) is influenced by properties of air, especially winds and turbulence.

The most important factor in determining the lapse rate is the amount of moisture in the air. Water is a unique molecule in the atmosphere, because it exists in all three phases (gas, liquid, solid).

The transitions between these phases require transfer of energy: This energy is known as latent heat.

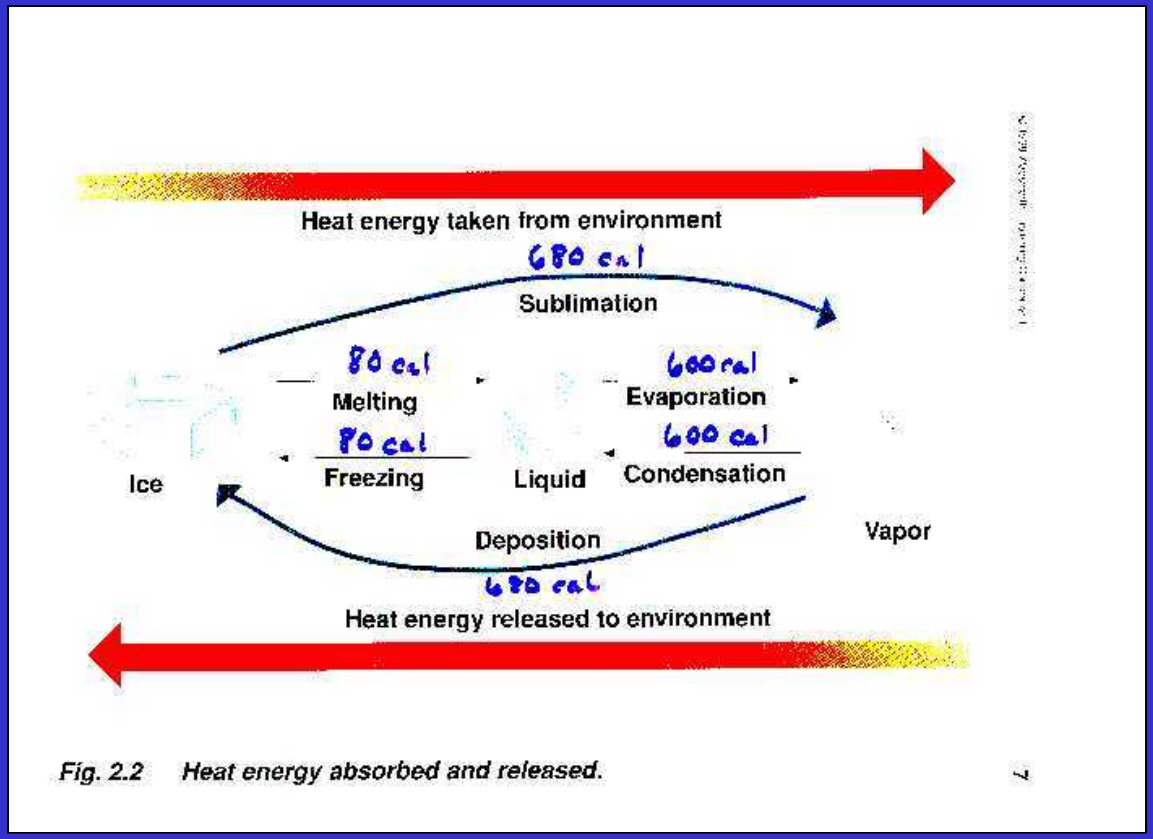

Fig. 2.2 Heat energy absorbed and released.

In dry air (i.e., no condensed water present), the temperature change is controlled by heat capacity of air:

Dry adiabatic lapse rate (Γ_d) ≈ -10°C/km

In saturated air (i.e., clouds present), the temperature change is modified by addition of latent heat:

Wet adiabatic lapse rate (Γ_w) ≈ -4 °C/km

Problem: It is a rainy day in Boulder (alt = 1600 m) and 55 °F. You are planning a trip to Vail and must cross the pass at 3350 m. Should you anticipate snowy and/or icy conditions?

55 °F is 12.8 °C (recall that °C = 5/9 (°F - 32)).

The change in altitude for the trip is 3350 - 1600 = 1750 m. According to the wet adiabatic lapse rate, atmospheric temperature should change about -4 °C per km or 1.75 x (-4) = -7 °C. Thus the ambient temperature should be about 6°C on Vail Pass. That's still a few degrees above freezing, but I think I'd still be prepared for snow or ice on the road!