The International Niagara Falls Competition

Of 1890

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The Problem

Move **100,000 hp**
from Niagara to Buffalo
over distance of **18 miles**

No one has transported that much power that far before.

Current technology limit: ~2 miles.

The Committee

- William Cawthorne Unwin, Professor of Engineering, Central Institution of the City and Guilds of London
- Coleman Sellers, Professor of Engineering, Steven's Institute of Technology, Hoboken, New Jersey
- Eleuthere-Elie-Nicolas Mascart, Professor au College de France
- Sir William Thomson (Lord Kelvin), President of the Commission
- Theodore Turrettini, President de la Ville de Geneva

Possible Plans

Original Plan (1850's)

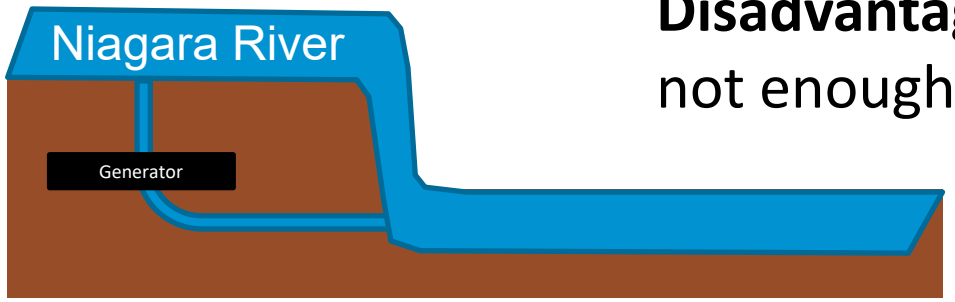
- 12 parallel canals
- 300 factories, each with their own water wheel.

Disadvantage: Destroy the river landscape

Evershed Scheme (1880's)

- 1 tunnel
- Transport power to 300 factories

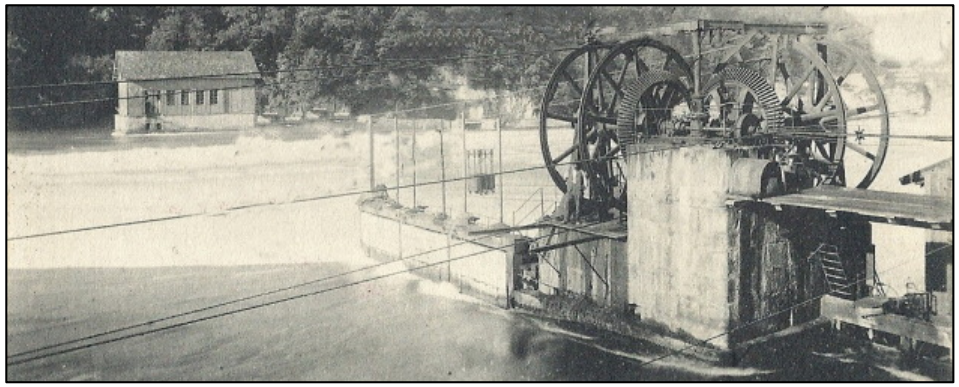
Disadvantage: Even 300 factories was not enough revenue for the venture.

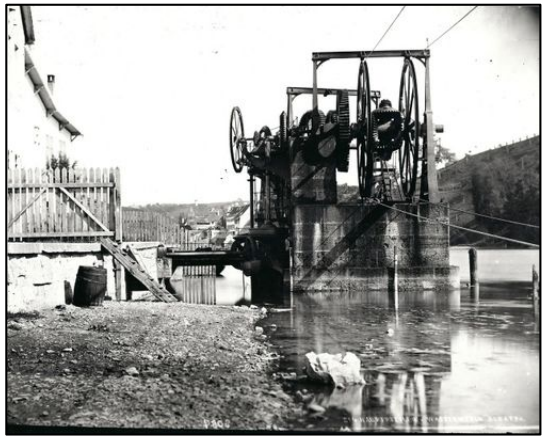


The Contestants

1. Cuenod Sautter & Co., *Geneva, Switzerland* – Complete plans for a hydraulic plant and electrical (DC) distribution to Buffalo.
2. Prof. Vigreux and M. Leon Levy, *Paris, France* – Complete plans for generation and aerial electric conductors (DC).
3. M. Hillairet and M. Bouvier, *Paris, France* – Complete plans for hydraulic machines and electrical (DC) distribution.
4. Prof. Riedler and M. Victor Popp, *Berlin, Germany and Paris, France* – Plans for hydraulic generators machines and transmission via compressed air.
5. Mr. G.F. Deacon and Messrs. Siemens Brothers, *London, England* – Complete project for hydraulic generation and electrical (DC) distribution.
6. Mr. H.D. Pearstall, *Orpington, England* – Utilization of power and distribution by compressed air.
7. Prof. Lupton and Mr. Sturgeon, *Leeds and Chester, England* – Complete arrangement for hydraulic motors and compressed air transmission.

Telodynamics (Wire Rope)





Used by: Zurich, Belgrade

Advantage: Held the record for the longest distance at 4 miles.

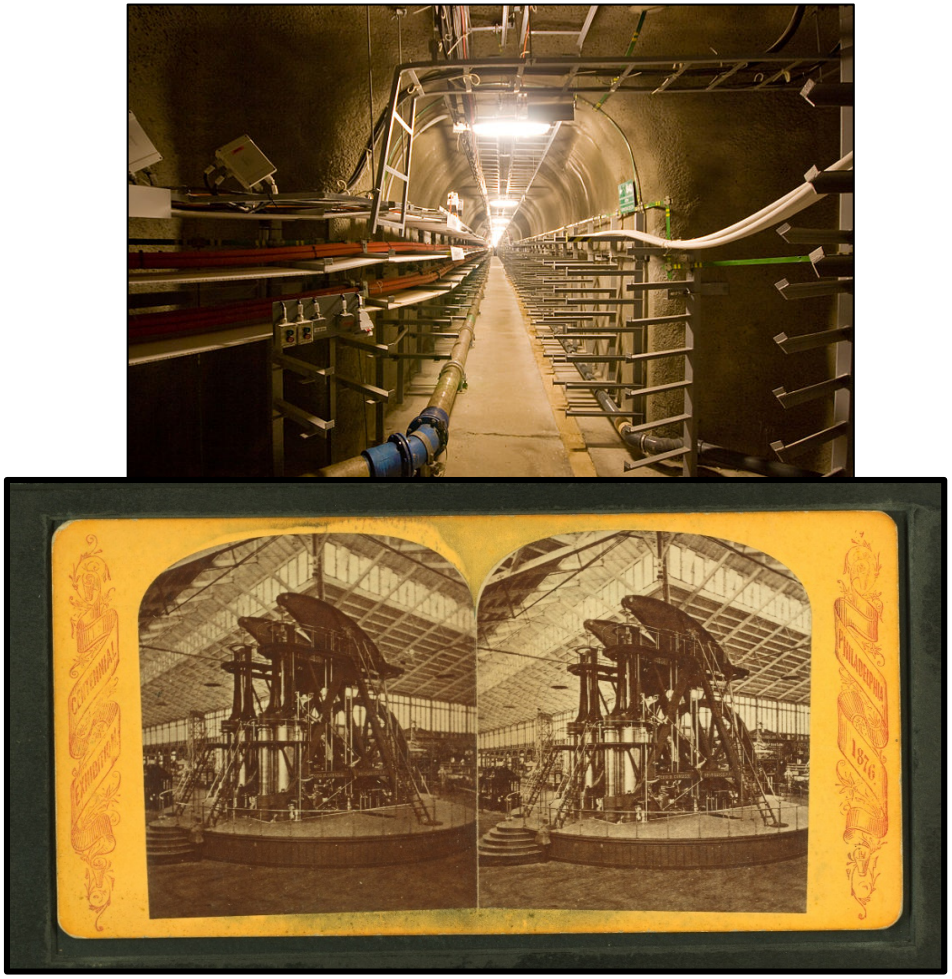
Disadvantage: Was prone to breaking

Steam

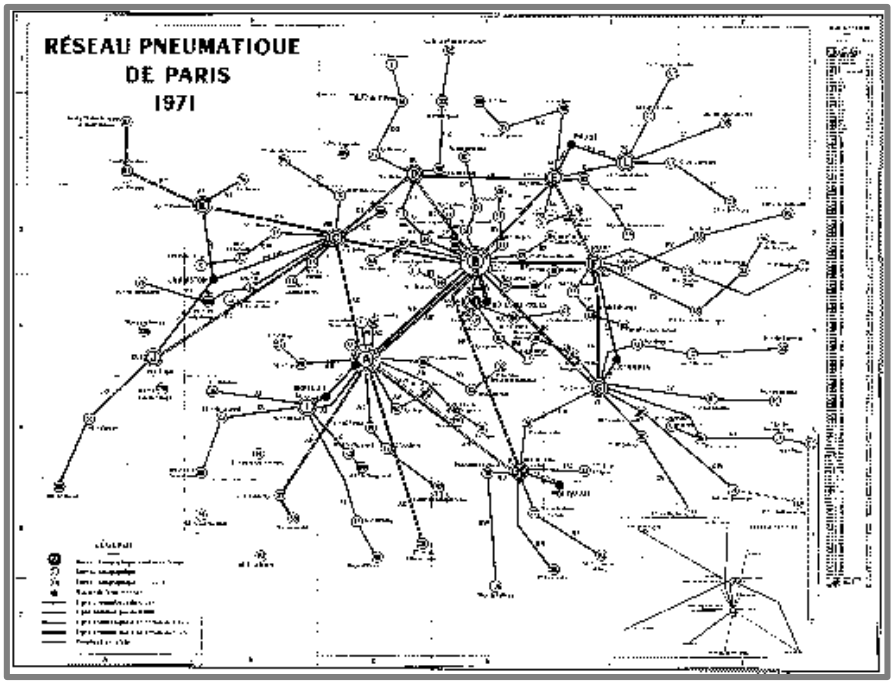
Used by: Birdsill Holley's Thermal utility pre-dated Edison's electrical power plant by 17 years

Advantage: The factories in Buffalo already use steam boilers, so the solution would be plug-and-play for customers.

Disadvantage: Would lose heat rapidly; would require heating stations along the entire 18 miles.



Pneumatics (Compressed Air)



Used by: Mines used pneumatics to run heavy machinery. Paris installed a city-wide pneumatic mail delivery system (pictured)

Advantage: Mature technology

Disadvantage: Largest system was 1 mile in diameter.

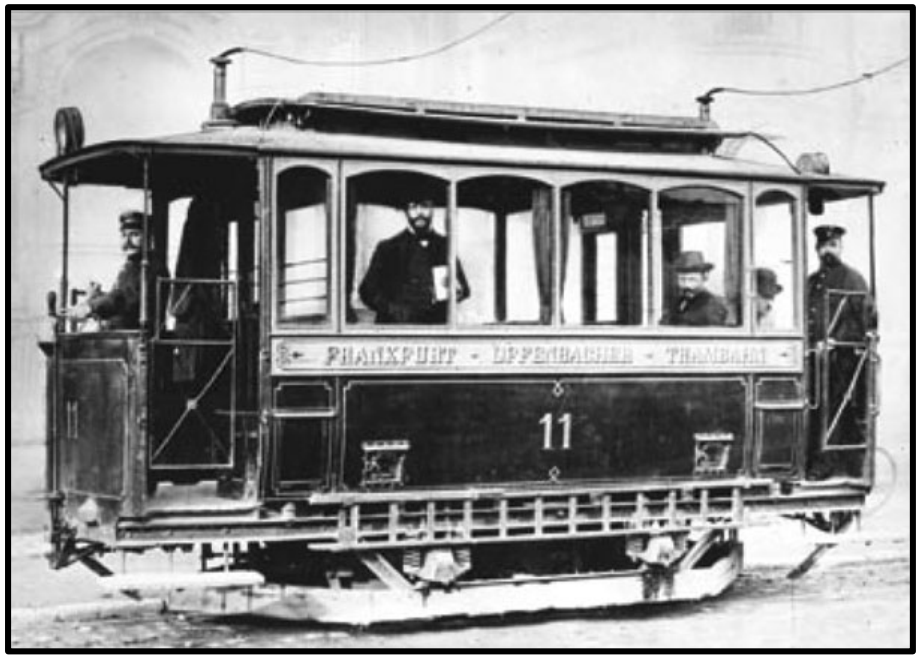
Electricity

Used by:

- DC power limited to 2 miles
- Portland built a 14-mile line to power electric streetcars.

Advantage: Held the record for distance.

Disadvantage: Reliability is questionable. The Portland line was destroyed 9 months into operations by the first winter storm.



The International Niagara Falls Commission

- Who should win the prize?
- Why?
- What are the issues at stake?
- What should Edward Dean Adams do?

CONCLUSIONS

The International Niagara Falls Commission - Conclusions

- Didn’t choose any winners

- 2nd place went to Cuenod Sautter & Co of Switzerland for their DC distribution system.

- No AC proposals won any 2nd or 3rd place awards.

What Happened?

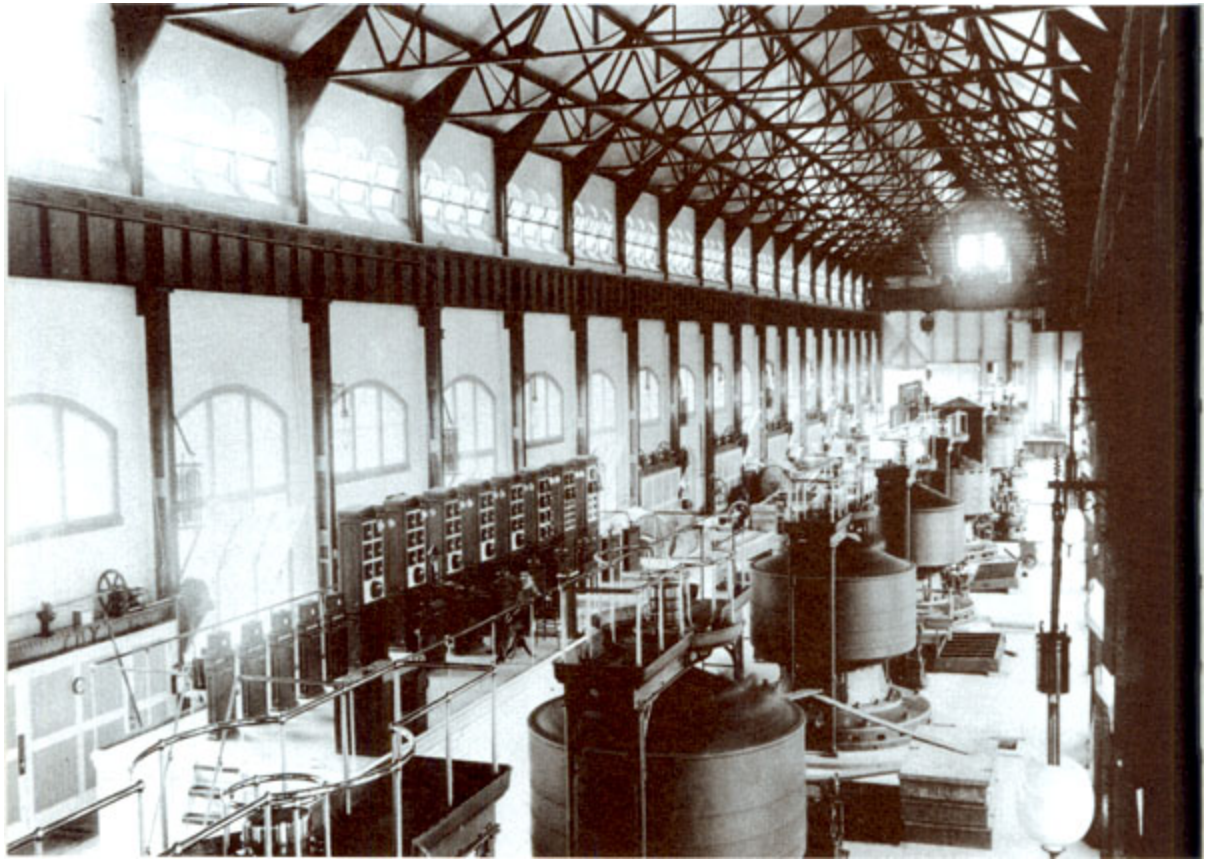
- 1891: No proposals chosen

- Chicago Exhibition
- Frankfurt to Lauffen AC line (100 miles)
- General Edison merged with Thomson-Houston to form General Electric

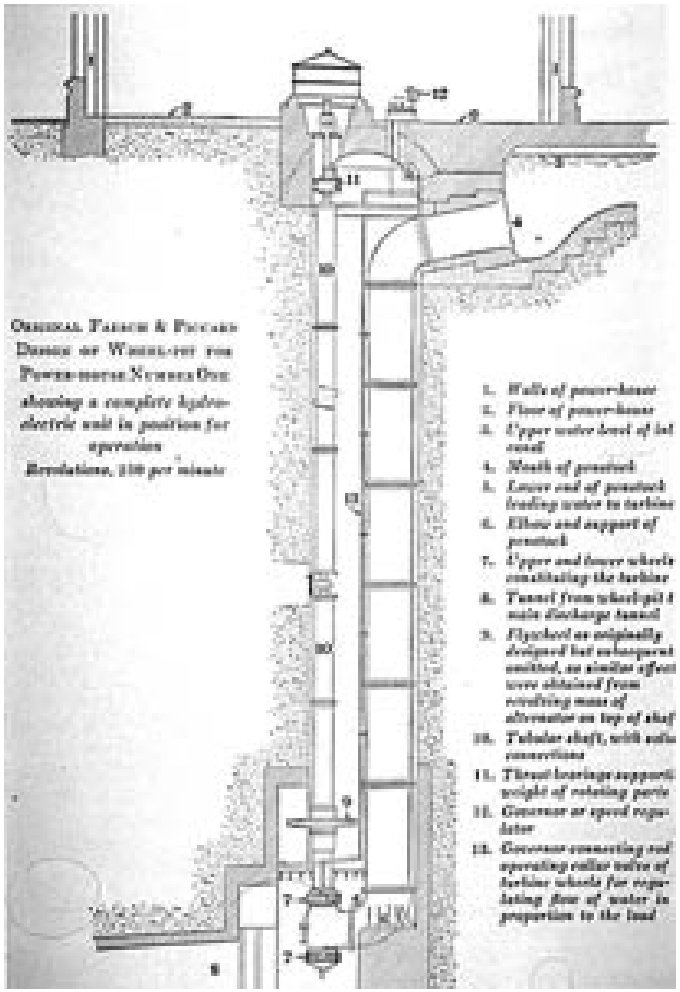
- 1893: 1st AC power plant proposal accepted

- 1896: 1st plant opened.

The Final Power Plant



Internal Plumbing



Discussion Points

- Power vs. Energy
- No Westinghouse or Edison proposal
- What was ‘best’ technology?
- Standards war and consolidation
- Experts can be wrong
- Responsibility for the “long tomorrow”

The “Long Tomorrow”

- We make decisions today based on best-available technology.
- But what if that changes within 5 years (a long time from a decision-making standpoint, but a short time from an infrastructure usage standpoint?)
- Solar PPAs last for 15 years. Will you company be in the same line of business in 15 years?
- What risks does it solve? What new risks does it introduce?

From *The History of the Niagara Falls Power Company*

- *"This history of the Niagara Falls Power Company is the story of the development of the pioneer hydro-electric system, forerunner of modern utility power service. It records the great step in the transition from the century of mechanical power to the century of electrical power.*

- *"But we can scarcely appreciate the meagerness of the experience upon which so important decisions were based and the seriousness of the problems which were yet unsolved.*

In Summary

- When ***consumption*** is aligned with ***corporate strategy***, organizations tend to consume just what they need.
- ***This is usually 30% less*** than what they are currently consuming due to elimination of wasted consumption.
- Finance, resource consumption, and environmental sustainability are interrelated through your ***company's operations***.
- A ***metrics-driven resource strategy*** can help improve all three outcomes.