

Driving Innovation & Delivering Solutions

Strategic Partnerships

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U Pitt – NETL Infrastructure Sensing Workshop
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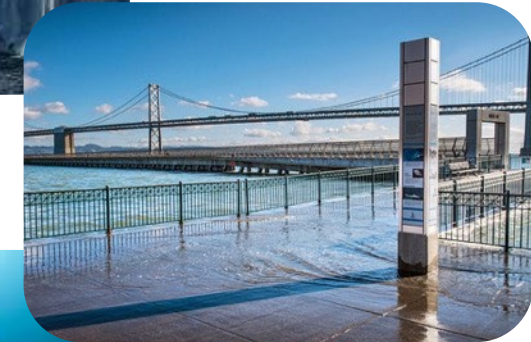
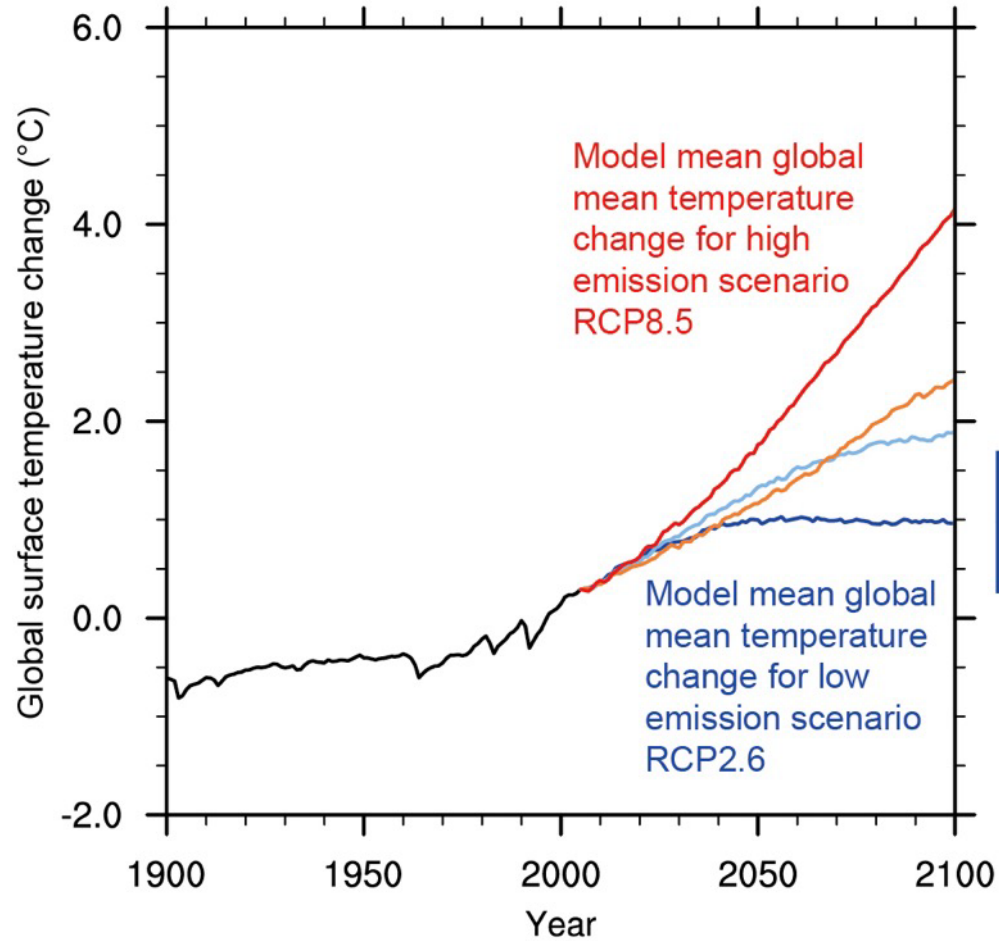


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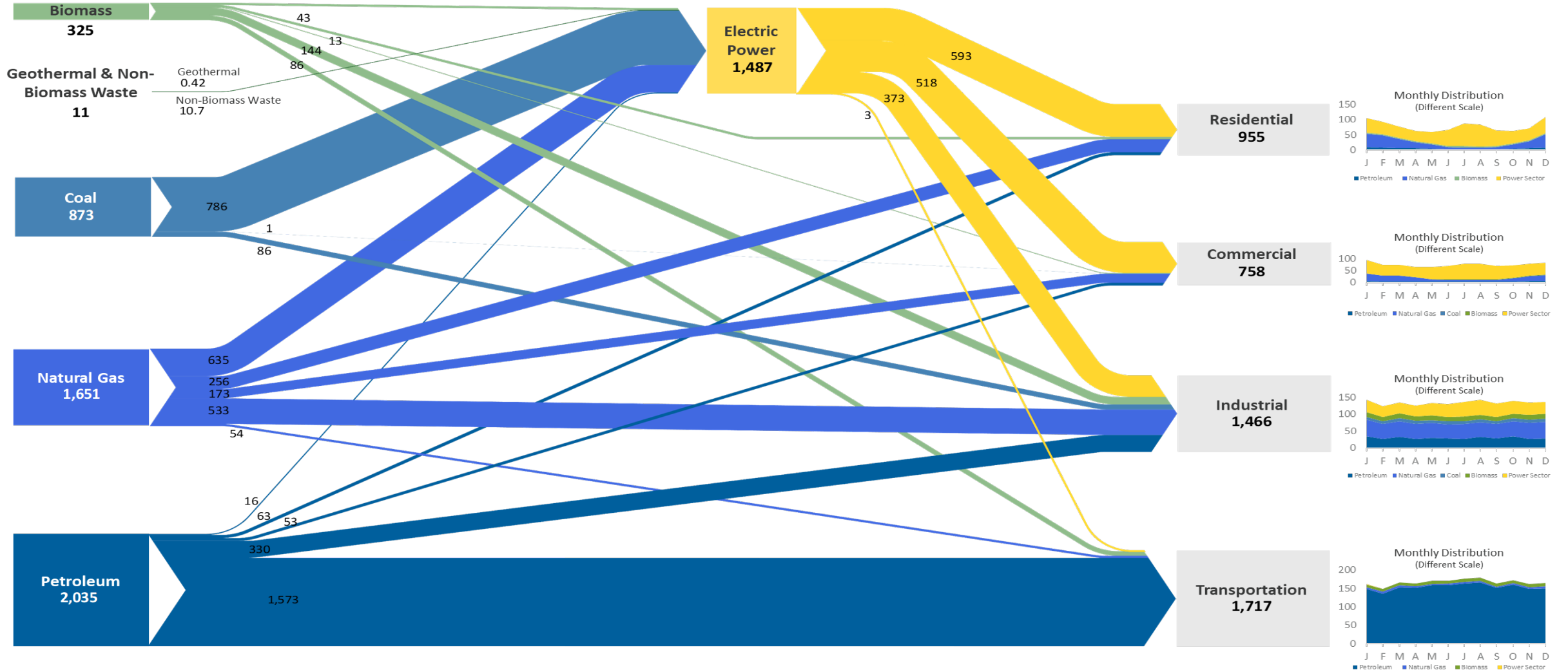
Climate Change – Urgency

Projected Global Temperature Increase



Approximate U.S. CO₂ Emissions

~5 Million Metric Tons



Taking Action!

- Largest fundings ever received by DOE

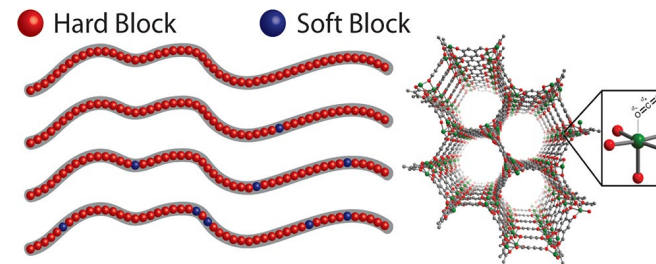
BIL

IRA

- Realignment of DOE



Copolymers + $M_2(\text{dobdc})$



Demonstration

Application

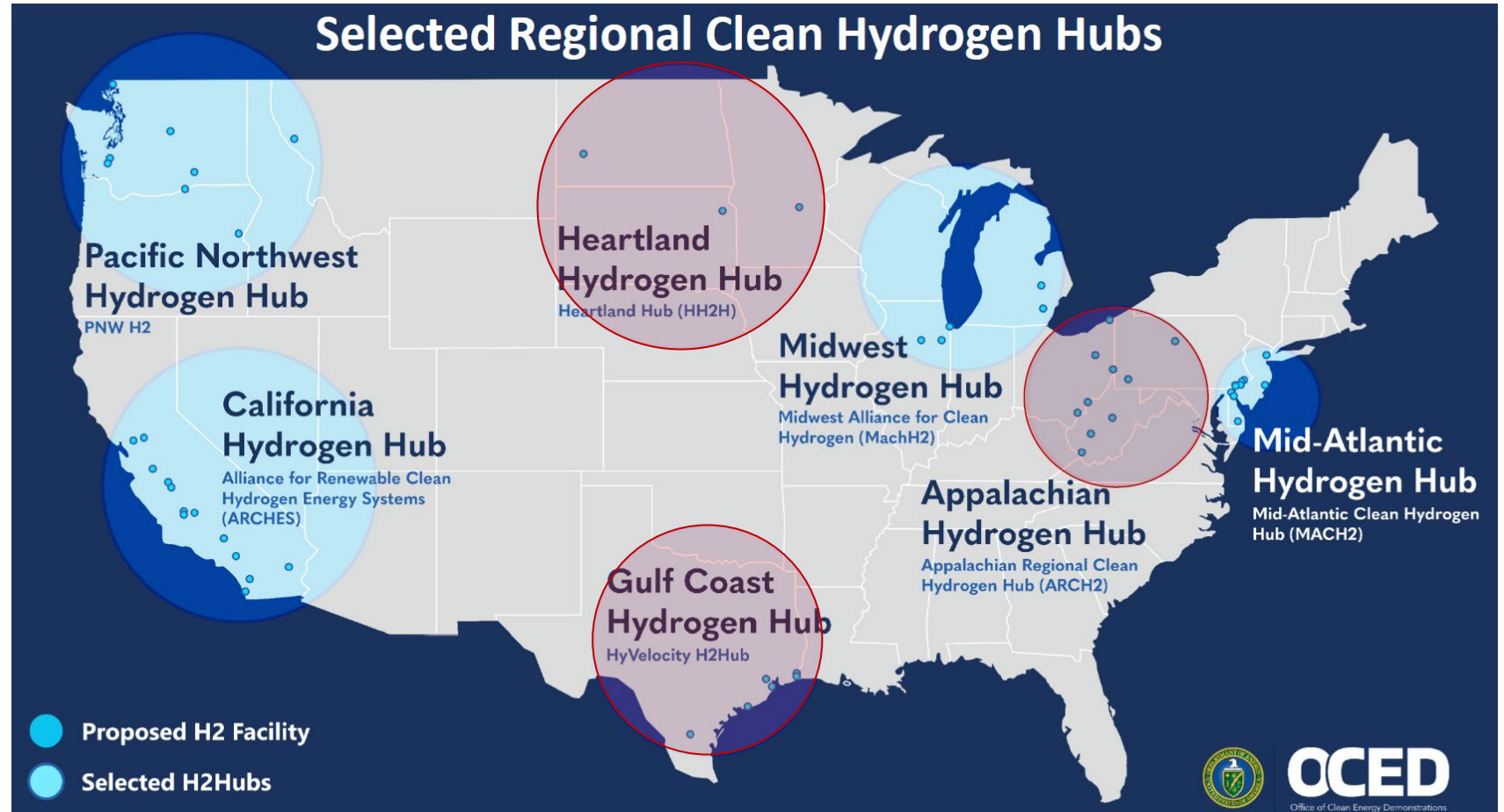
Science

Regional Clean Hydrogen Hubs

NETL Partner to Three Selected Hydrogen Hubs



- NETL providing support for **hydrogen hubs using fossil-based production with CCS**
- Leverages NETL strengths in TEA, LCA, market analyses, and data management
- Providing cost/emissions tradeoff analyses enroute to a hydrogen economy



[NETL and Partners Win Hydrogen Hub Investments](#)

Key Investments & Facilities

Direct Air Capture (DAC) Center



CO₂ Conversion Center



Adv. Computing Infrastructure



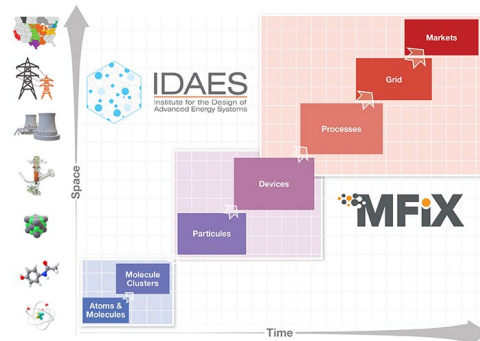
Pilot-scale CFB



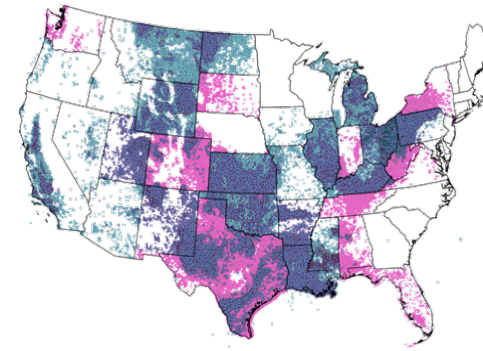
Adv Alloy Dev. Center



IDEAS & MFIX



Science-based AI/ML Inst. & EDX



In-situ Geo-Imaging



NETL DAC Center

First Material Scale DAC Test System Online



Material Scale

Novel Material Assessments
(~0.1 kg CO₂/day)



Operational

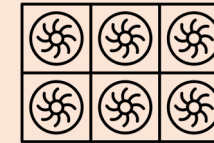


Module Scale

Form Factor Evaluation
(~4 kg CO₂/day)

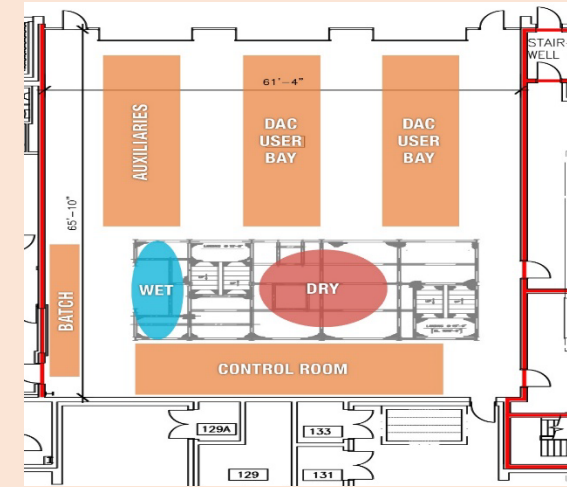


Shakedown



Prototype Scale

Developer-built Unit Testing
(~30 kg CO₂/day)



Design

Technology Priorities

Accelerate Deployment

Carbon Management



Point Source Capture

Reduce costs and eliminate secondary emissions



CO₂ Removal

Reduce costs of CDR from dilute sources



Carbon Utilization

Promote revenue generation from CO₂



C-Storage & Transport

Enable permanent storage & efficient transport



H₂ with Carbon Mgt.

Advance H₂ production & utilization technologies

Resource Sustainability



CH₄ Mitigation

Quantify and mitigate CH₄ emissions



Critical Materials

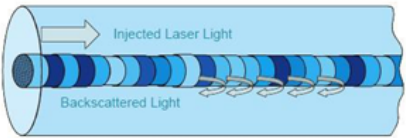
Enable domestic production from novel resources

Measurement, Monitoring, Reporting & Verification

Sensing Platforms

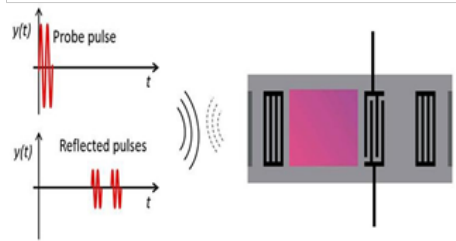
Long-distance Distributed Optical Fiber Sensors

Imperfections in fiber lead to Rayleigh backscatter.

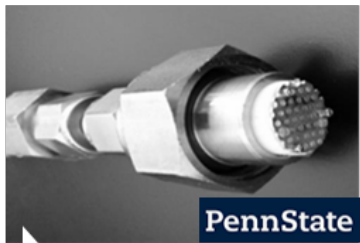


Rayleigh backscatter forms a permanent spatial "fingerprint" along the length of the fiber.

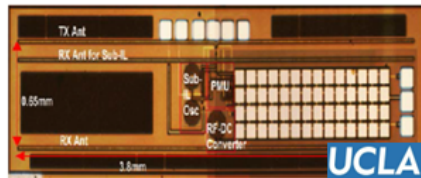
Passive Wireless Sensors



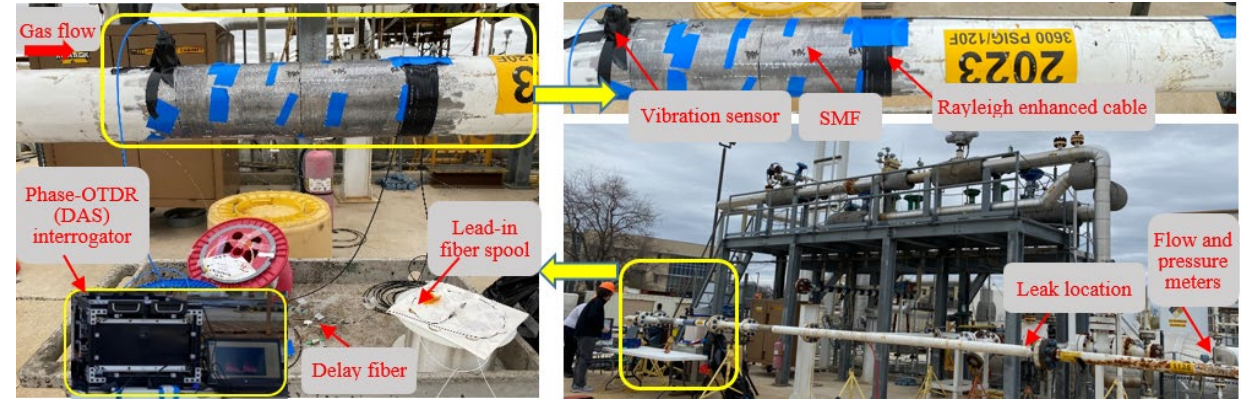
Advanced Electrochemical Sensors



Wireless Miniature Silicon Integrated Circuit (SiC) Sensors



Field Testing



Commercialization



Recognition



Thank You!

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