EIA and SAIS 2010 Energy Conference
Energy and the Economy

Technology and Energy Transformation

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Scale, time, and complexity

Science and Technology

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Economics and Business

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Society and Environment

+

Policy and Government

Scale, time, and complexity

History,
the present,
and the future
always co-exist

Existing supply and demand infrastructure

Multiple generations of technology

New resources, infrastructures, and paradigms

Scale: trillions…..

- Delivering a trillion gallons of fuel per year
- Finding and developing the next trillion barrels of oil
- Adding the next trillion(s) watts of power generation
- Eliminating a trillion tons of produced CO2
- Investing more than $25 trillion in capital

“1% matters”

- Adding 1% to global oil reserves requires about $200 billion in exploration and production investment
- U.S. ethanol production is about 1% of total global fuel liquids production
- 2.5 million EVs would displace about 1% of US fuel demand

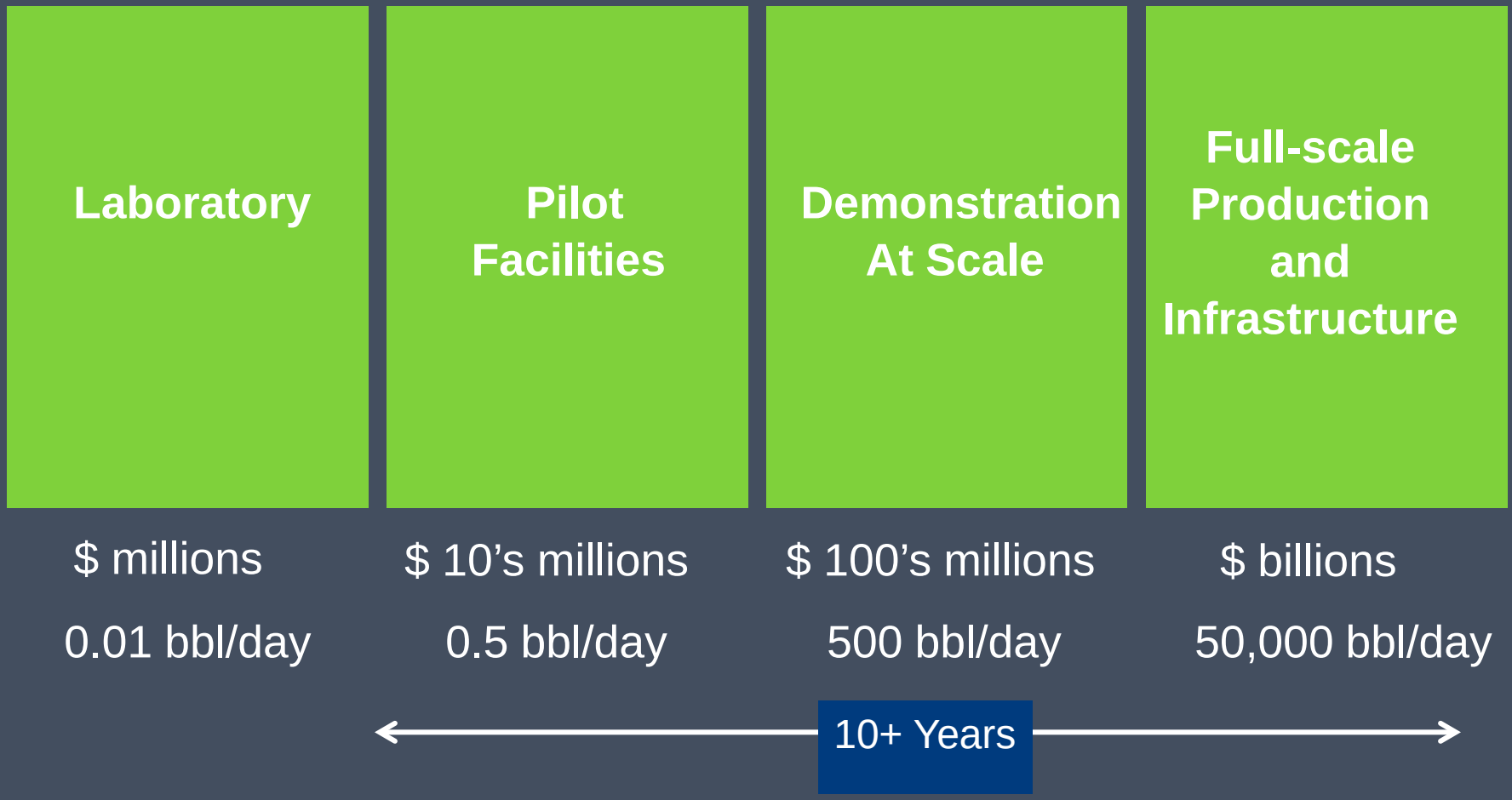
Transcending technology trends

- Universal digitization and computing
- Molecular transformation
- Human – technology relationships

Energy technology trends

- Developing “intelligent” energy infrastructures
- Diversifying feedstock for fuel and power
- Storing energy at scale
- Re-engineering natural systems at scale

R&D to commercial deployment: diversifying feedstock for fuel at scale



“Smart Grids”: developing intelligent infrastructures

- Directly couples two of the world’s largest infrastructure systems
- Promises efficiency gains for the grid and effective integration of variable sources
- Creates a system of significantly increased complexity
- Creates a cyber-physical system with additional security challenges

Complexity and Smart Grid

“____ Faces Revolt Over Smart Grid. Consumer backlash and cost concerns may slow the introduction of "smart" utility meters”

“Customer backlash over smart meters and skyrocketing electric bills.”

“Anti-Meter Fever Spreads as Regulator and Customer Mistrust Grows”

Cyber-security:
“Hackers Are Inside the Power Plant”, Study Says”