



AM in the Energy Sector: Innovative Design for More Efficient Energy Generation

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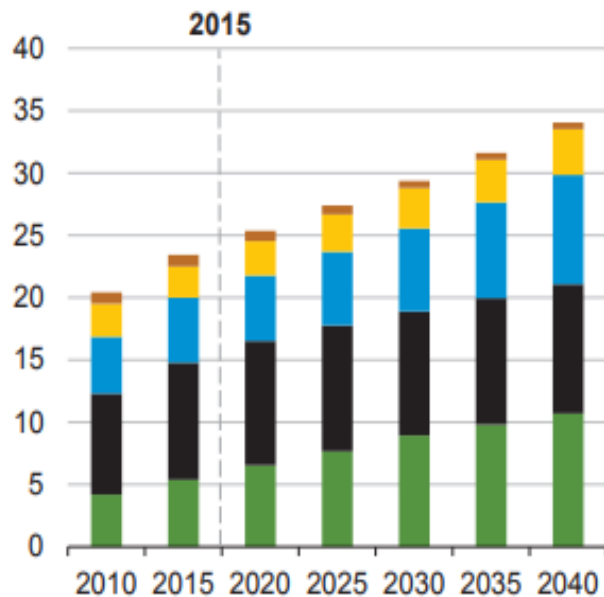
Global energy trends



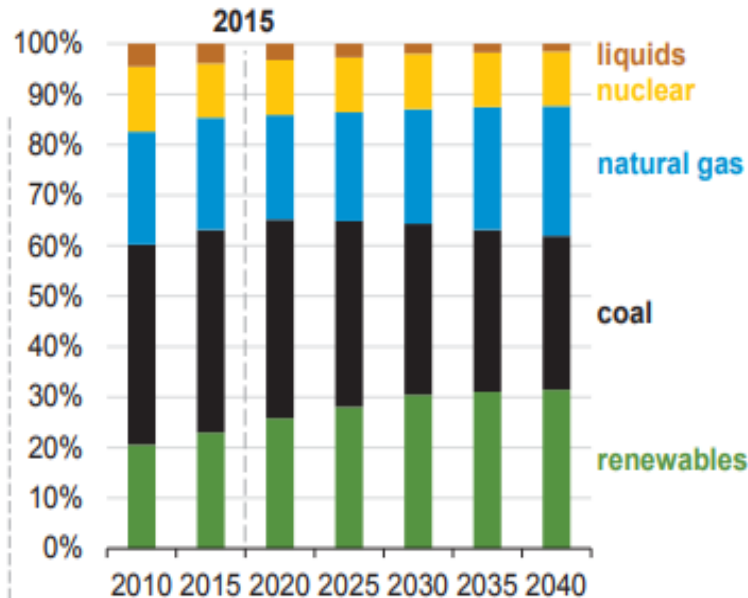
World power generation outlook

RES are here to stay, power generation growth decoupled from GDP

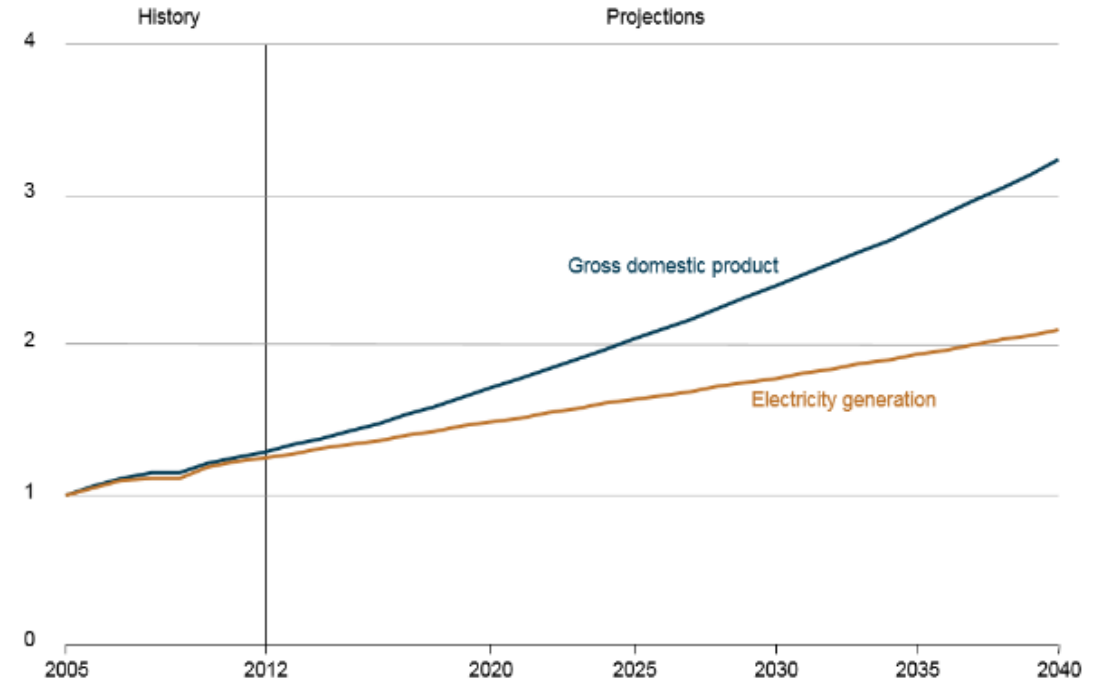
World net electricity generation by fuel
trillion kilowatt-hours



Share of net electricity generation
percent



Growth in world electricity generation and GDP
2005-2040 (index, 2005=1)

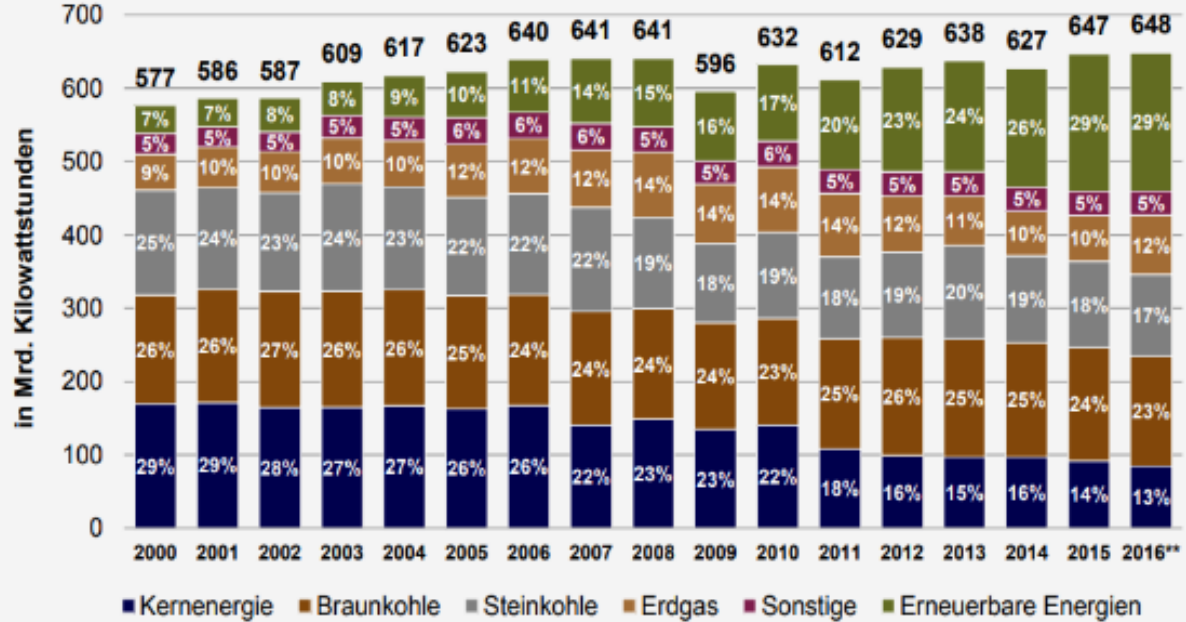


Impact of growth of RES

Gas becoming an attractive, low-CO2 option to adapt to load fluctuations

Germany Example

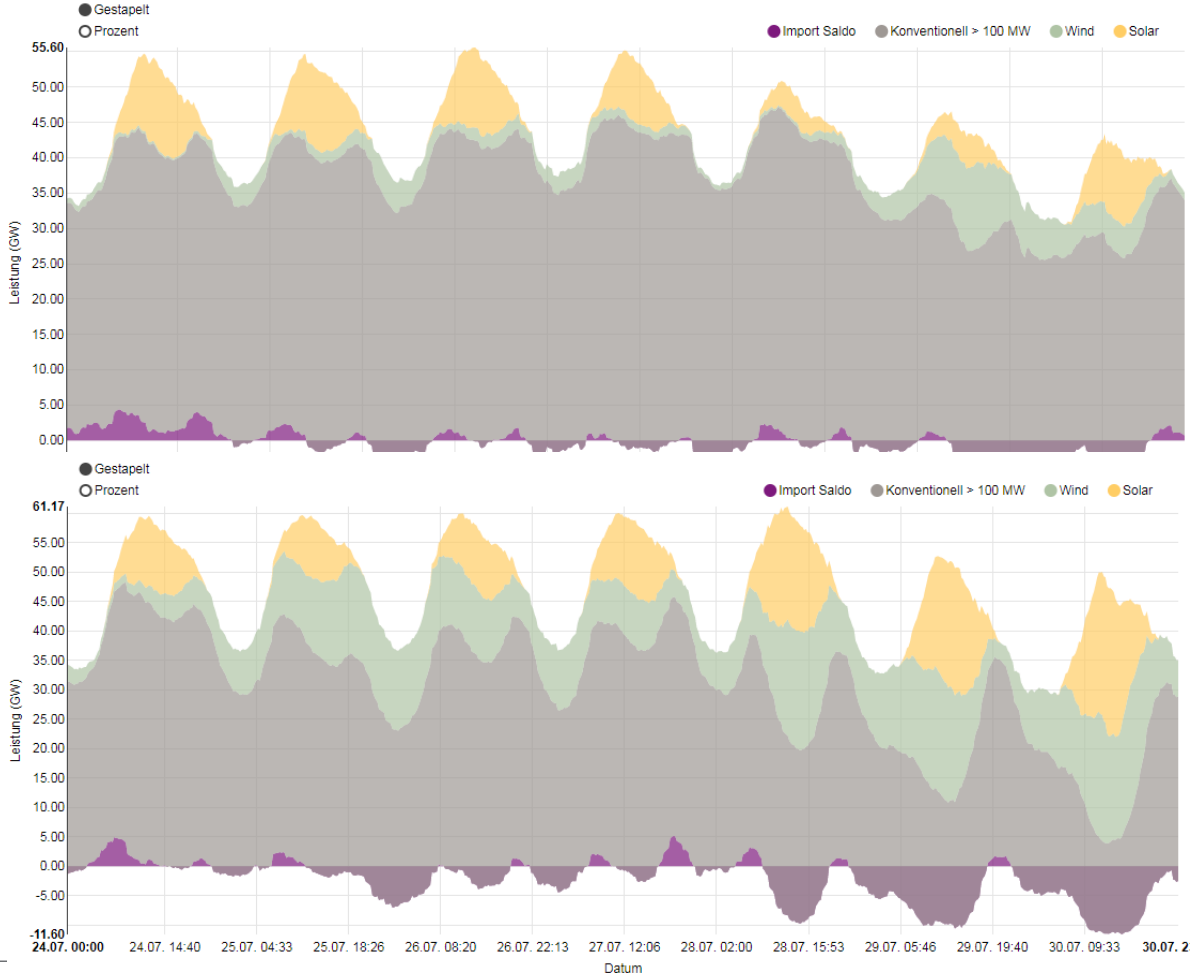
nach Energieträgern – Anteile in %*



Quelle: BDEW, Stand: 02/2017

*Rundungsdifferenzen möglich
**vorläufig

Week 30 (late July) in 2010 vs. Week 30 in 2017 →
Source: Fraunhofer ISE

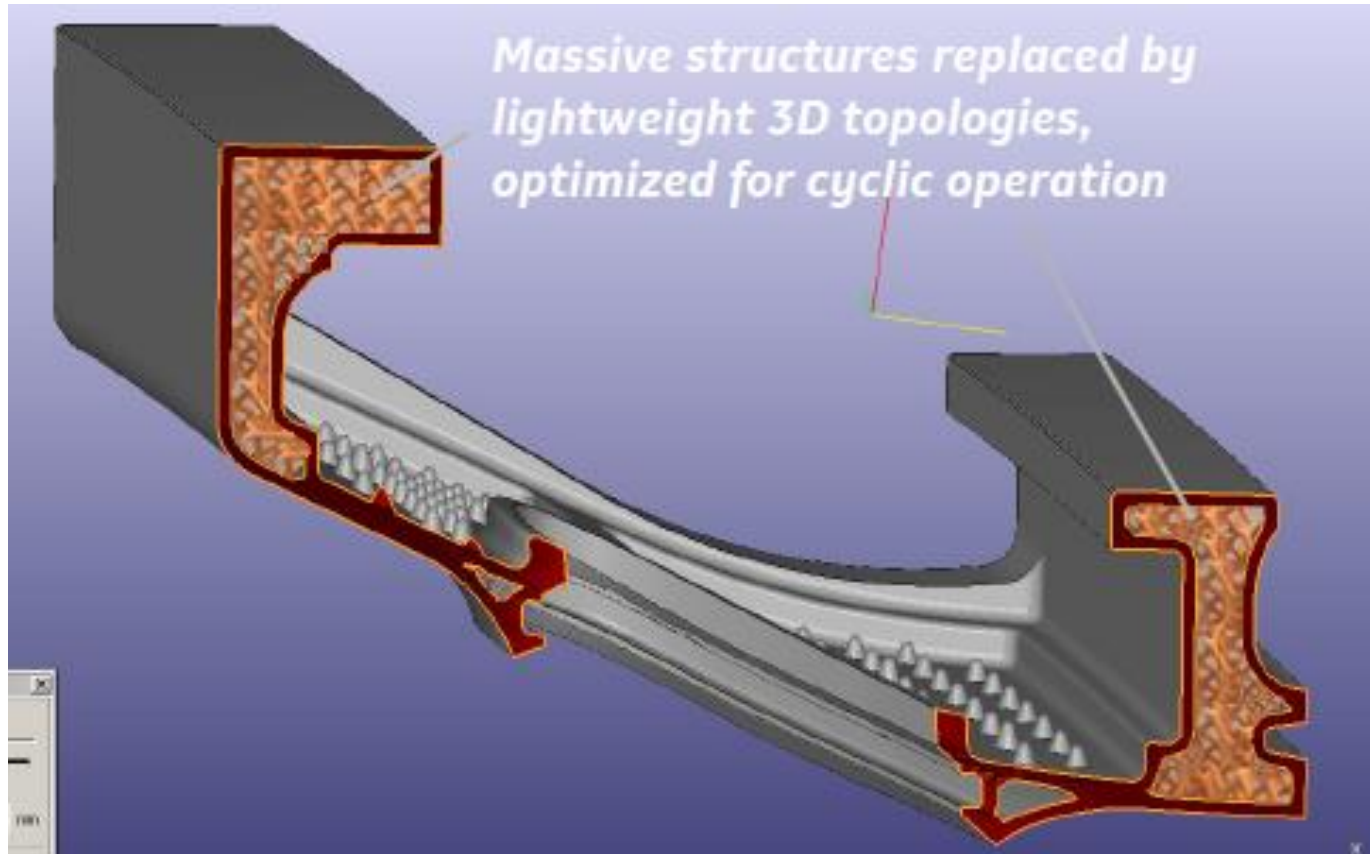


AM Opportunities in Energy Challenges



Energy trends favor rise of AM

Cyclic operation drives lightweight AM designs

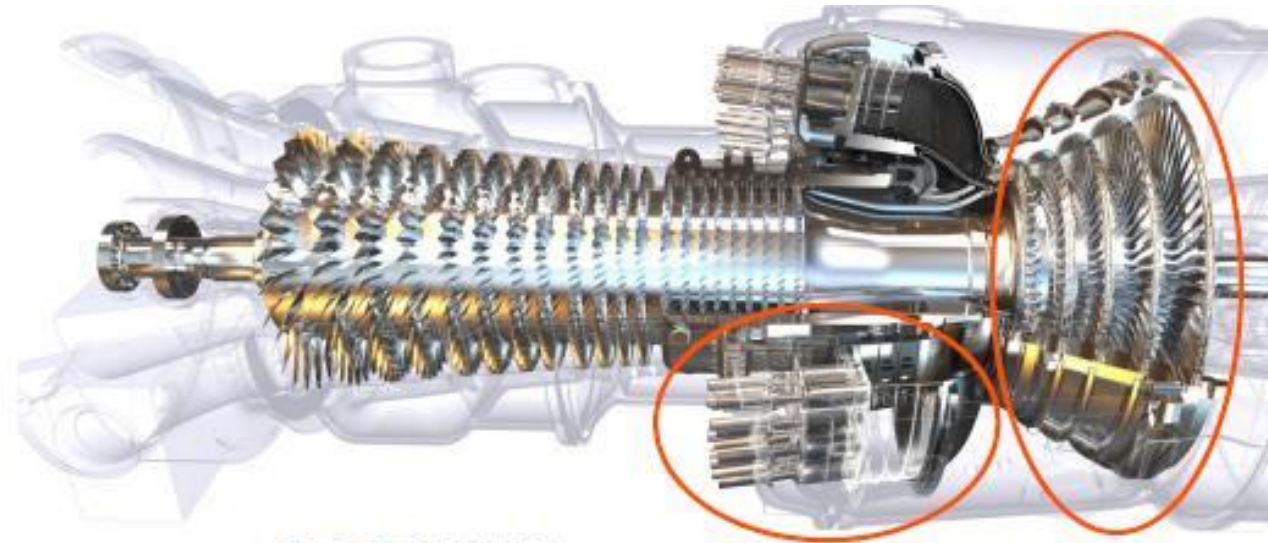


- Current components designed for base load operation
- Removing mass and wall thickness allows to increase resistance to LCF ... but this requires new manufacturing processes
- Plants could soon be “LCF-free”



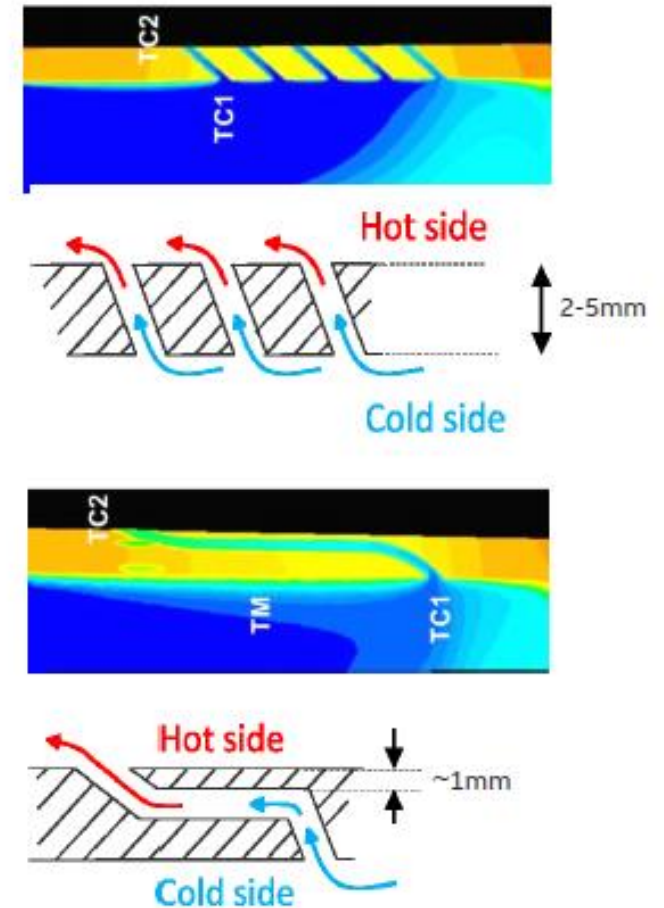
Gas turbine focus areas for AM

High-tech components, better efficiency for lower CO2 emissions



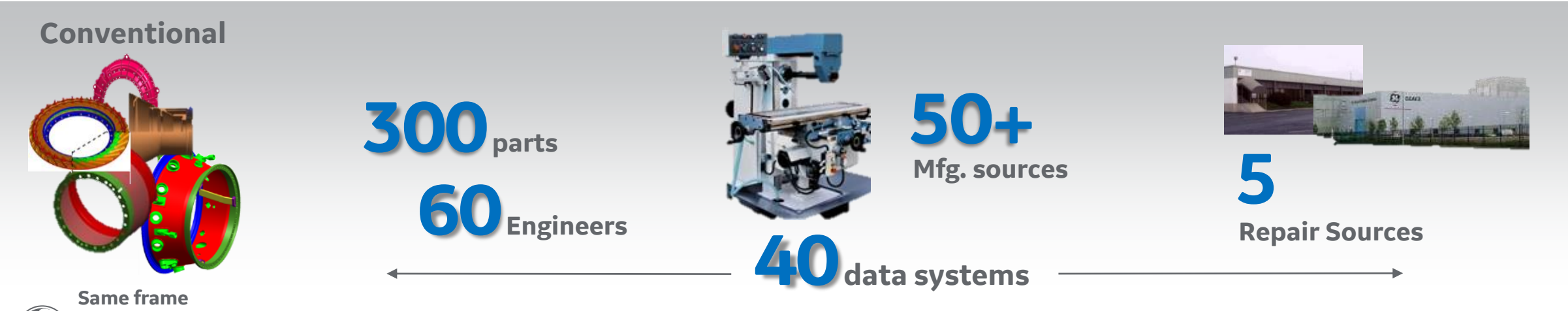
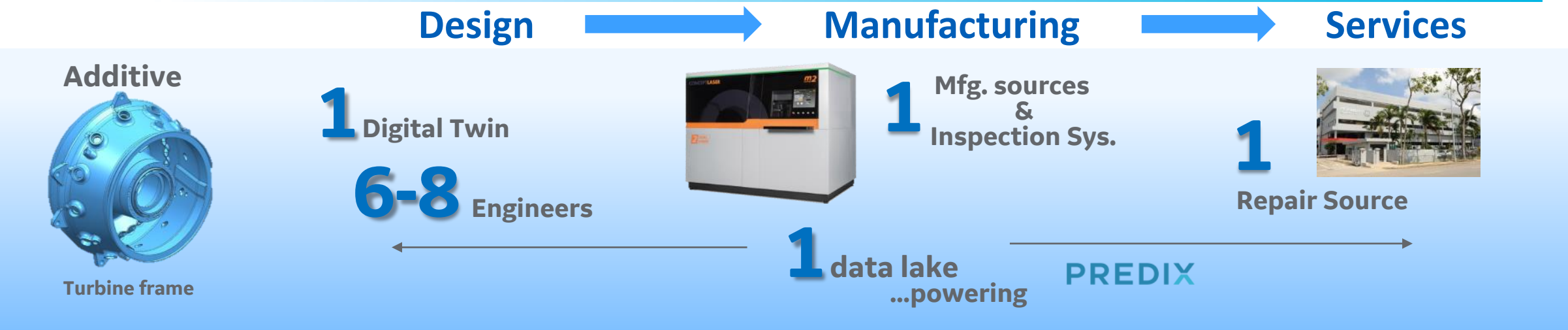
GE GT13E2

- Combustor parts: fuel nozzles, burners, swirlers, liners & dampers, ...
- Turbine parts: shrouds (heat shields), nozzles (vanes), buckets (blades)
- Long near wall cooling channels make more efficient use of the cooling air → higher turbine efficiency



Enterprise level disruption

20-25k AM parts already in the field



GE Additive Customer Experience Centers

Americas

Europe

Middle East

China

Australasia

Our Customer Experience Centers are designed to help customers understand the additive process; from design to prototyping to production and support them along the way



Customer Collaboration

- Application Engineering
- Rapid Prototyping
- Low Rate Manufacturing



Customer Training

- Additive Design
- Additive Machines
- Additive Materials



Customer Support

- Field Support
- Spare Parts
- Materials
- Logistics





Together, we work to build the future