MAN Energy Solutions
Future in the making

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Keynote session 5:

Hybrid Systems - Towards a Low-Carbon Society

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MES Focuses on Three Major Hybrid Power Applications

Our customers are in need for distributed, hybrid power

Why hybrid

- **RES** in most cases clearly beat marginal cost of oil & LNG fired generation
- **Storage** creates value through CAPEX/OPEX savings, e.g., spinning reserve integration of renewables
- **Thermal generation** provides firm backup capacity and CHP; can be CO2 neutral (e.g., biomass, PtX)

Why distributed

- Increased **security of supply** (e.g., fast ramp up, fuel flexibility, redundancy)
- In many cases **lower generation cost** (e.g., use of waste heat, reduced grid invest)

MDT focuse on three major power applications

1 

Hybrid fuel saver

2 

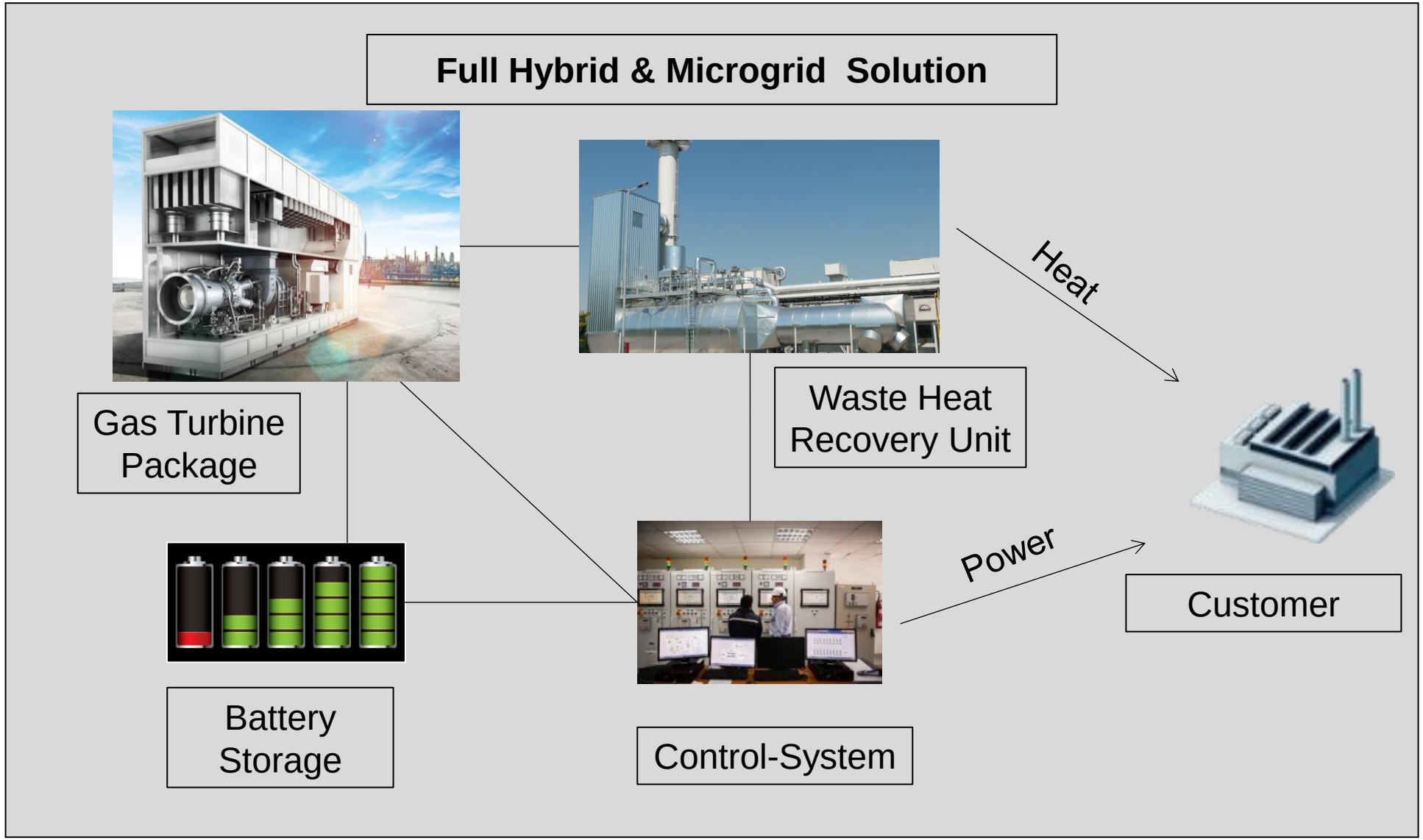
Hybrid island power plant / microgrid (electrical & geographical islands)

3 

Decentral highly flexible thermal power plants

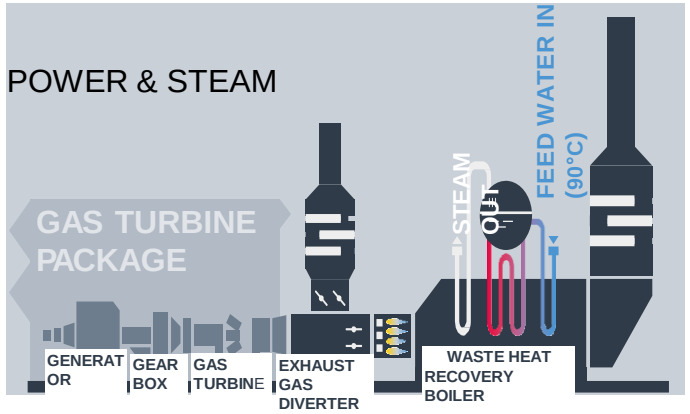
Power Generation Solutions

Your Supplier for Holistic Power Systems



Combined Steam & Power

Hybrid Solution in Cogeneration



Without SF

	Daily Period	Night Period
Power output_MGT6000:	5 to 6 MW	6 MW
Power output_PV fied:	2 MW	0 MW
Power output_Plant:	7 to 8 MW	6 MW
Steam production_10bara:	15.3 t/h	15.3 t/h

Yearly Savings of Natural Gas : 10948 MWh

Payback time less than 5 years

CO2 reduction : 7388 tons/year

NOx reduction : 5.0 tons/year

Hybrid plants with thermal generation, renewables and storage are enabler decarbonized energy systems

Combined Hot Water Production & Power

Hybrid Solution in Cogeneration

Hot Water out: 110°C

Hot Water in: 60°C

POWER & HOT WATER

	Daily Period	Night Period
Power output_MGT6000:	5 to 6 MW	6 MW
Hot Water prod. Capacity:	23.8 MW	11.9 MW**
Solar Field Capacity*:	11.9 MW	0 MW

*Solar Field is used in daily time as an alternaive to SF

**SF is not needed in Night period

Yearly Savings of Natural Gas_Solar Field : 27925 MWh

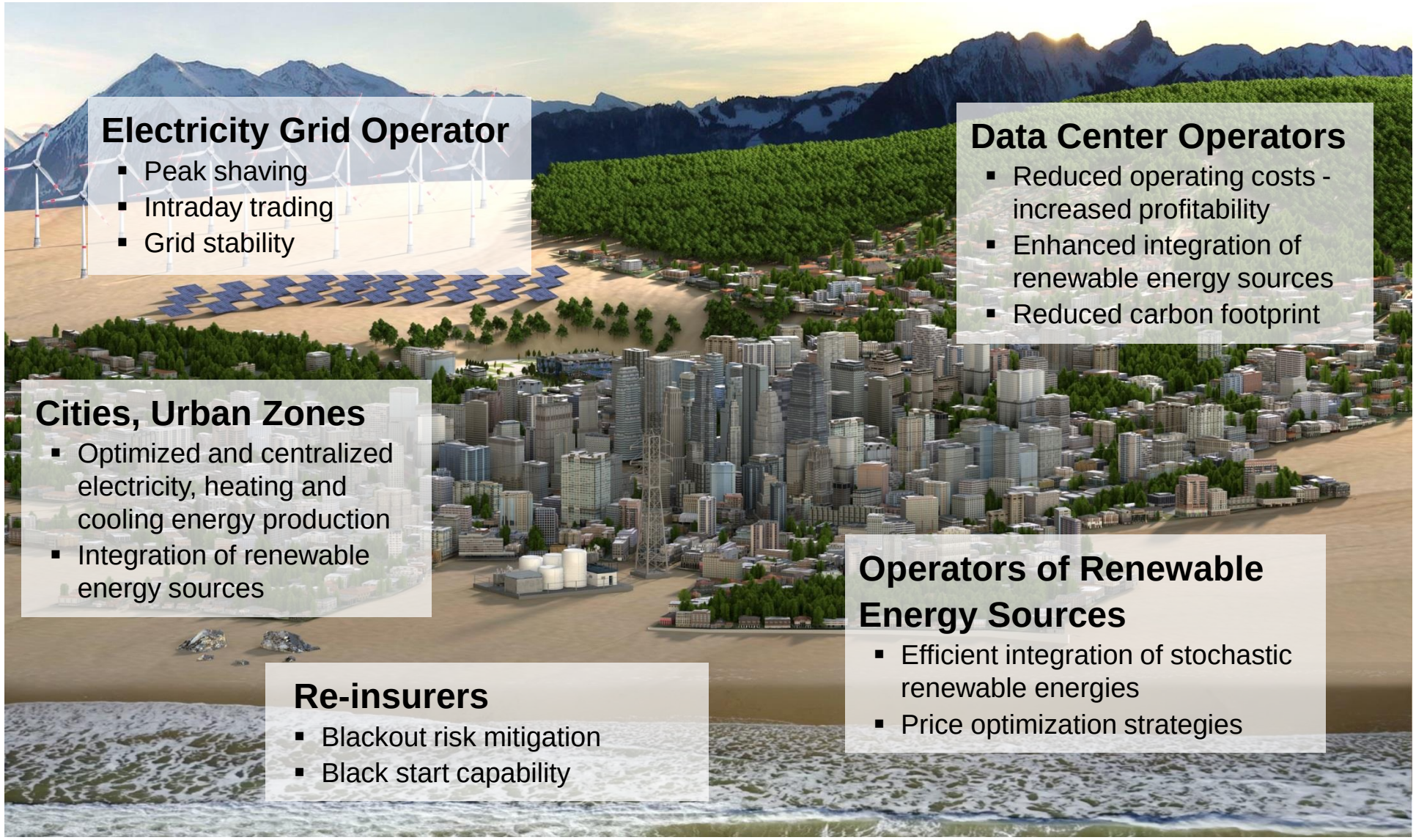
Payback time less than 5 years

CO2 reduction : 13963 tons/year

NOx reduction : 8.4 tons/year

Hybrid plants with thermal generation, renewables and storage - contribution to sustainable and efficient heat supply

Conclusions: Challenges and Mitigation



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Thank you very much!

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