

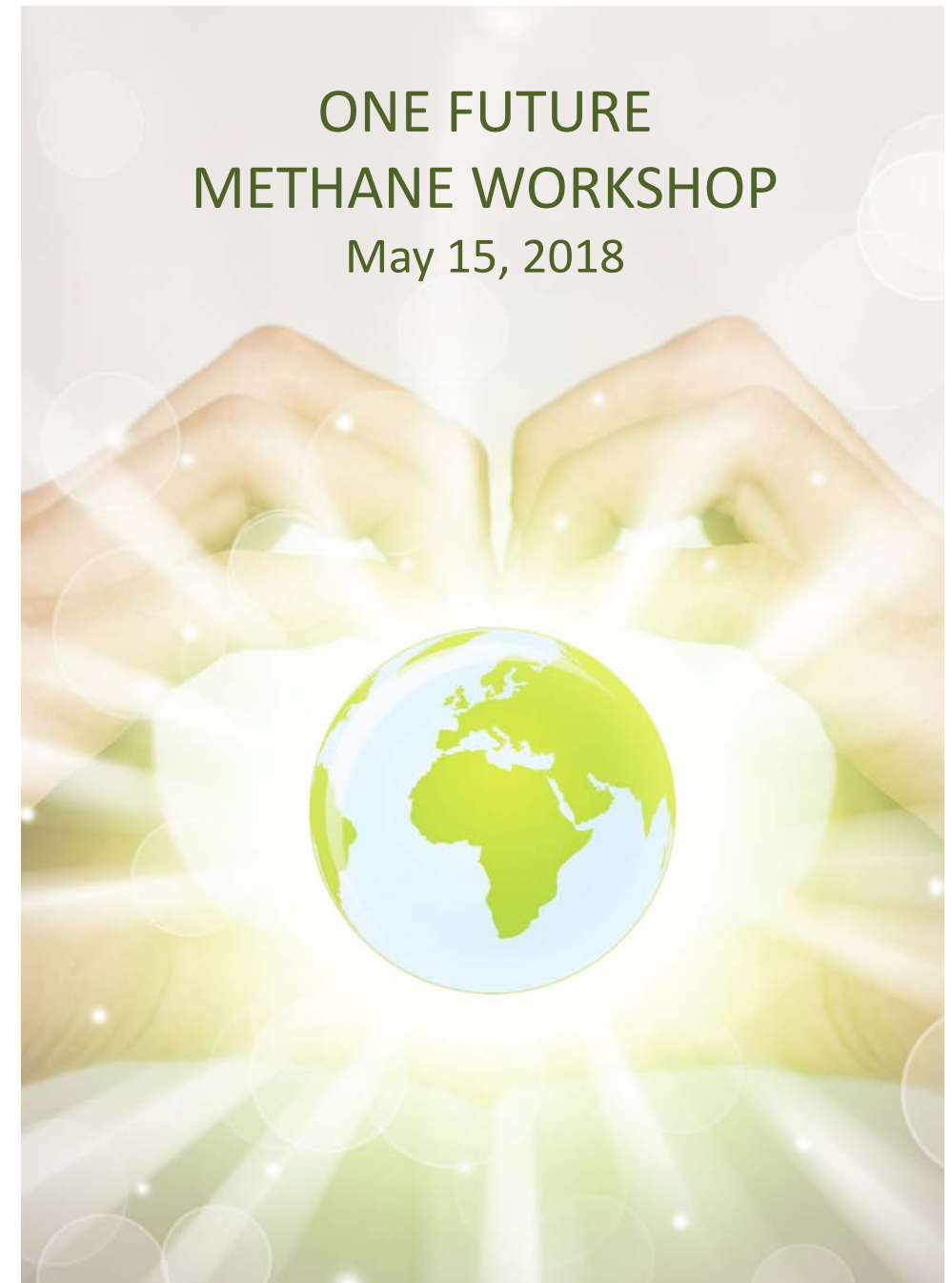


NATURAL GAS AND THE LOW-CARBON ECONOMY

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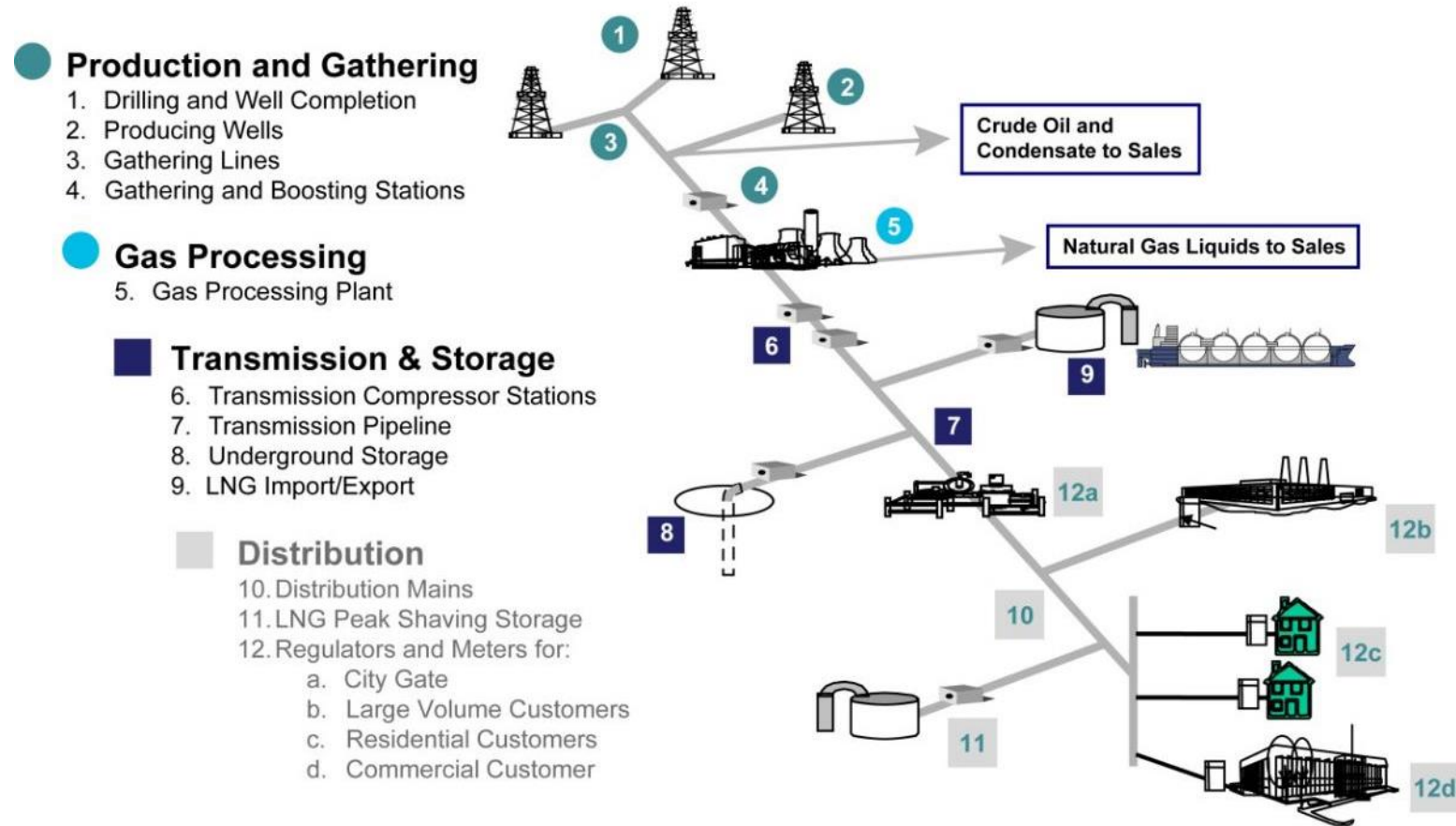
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METHANE EMISSIONS

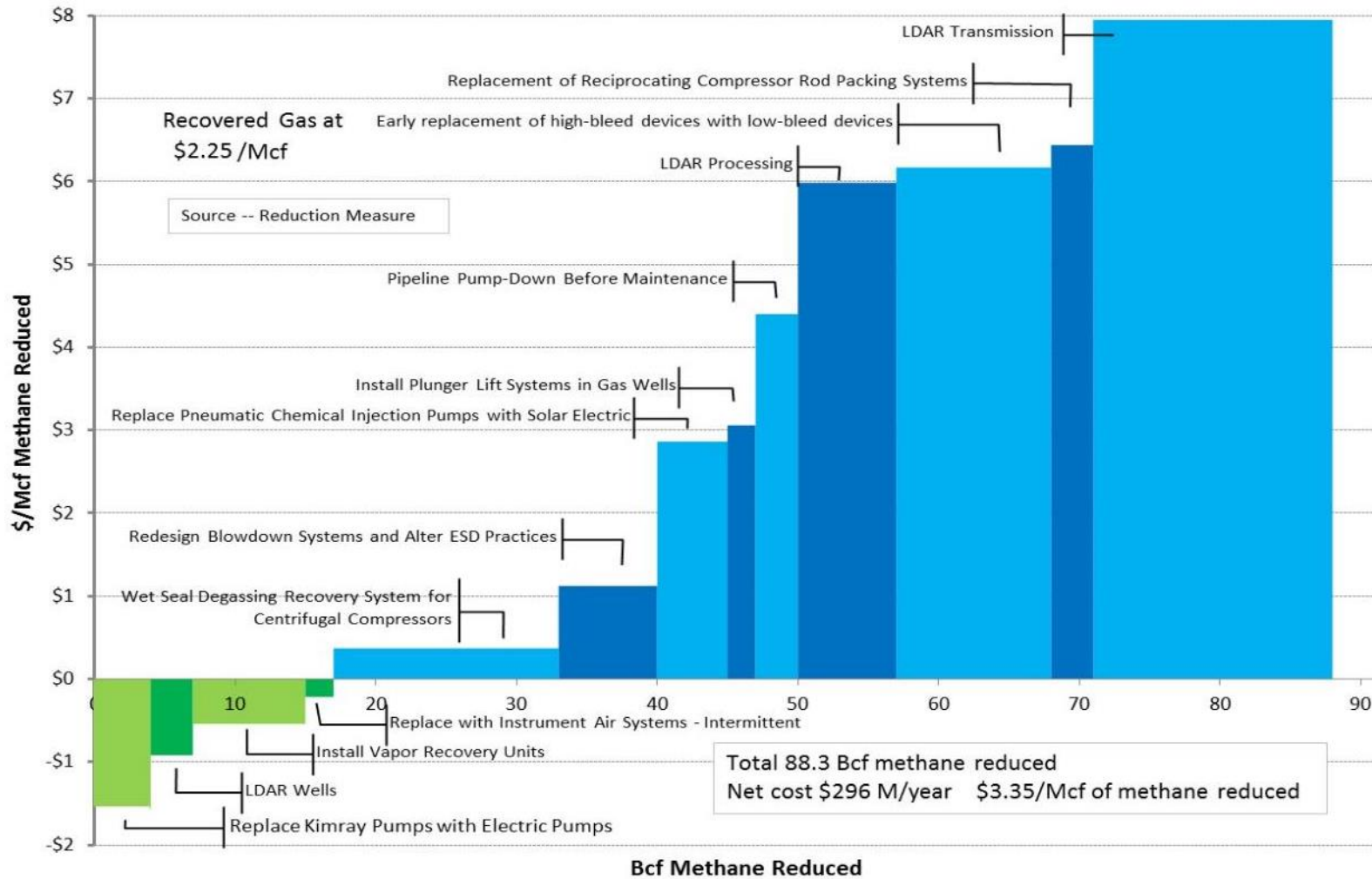


Natural gas systems encompass wells, gas gathering and processing facilities, storage, and transmission and distribution pipelines.



Source: Adapted from American Gas Association and EPA Natural Gas STAR Program

REDUCTION OPPORTUNITIES



POLICY OPTIONS

TECHNOLOGY-BASED DESIGN

Command-and-Control Approach

- Pre-defined emission control technologies are applied to all “affected sources”
- Application of control technology is required regardless of the actual emission profile of the source
- Technology-based design is more appropriate for a smaller population of homogenous emission sources
- Monitoring, recordkeeping and reporting requirements are burdensome due to large number of emission sources

PERFORMANCE-BASED DESIGN

ONE Future Approach

- Performance-based design allows companies to focus on “super emitter/fat-tail” emission sources
- Each company optimizes emission reductions by focusing capital deployment on its highest emitting sources
- Technology-neutral approach encourages development of new technologies to achieve emission reduction goals
- Intensity-based metrics enable benchmarking between companies, regardless of size

THE FUTURE OF NATURAL GAS

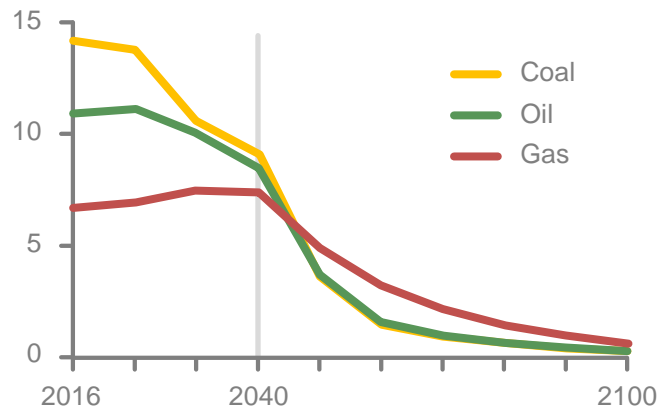


THE LOW-CARBON ECONOMY

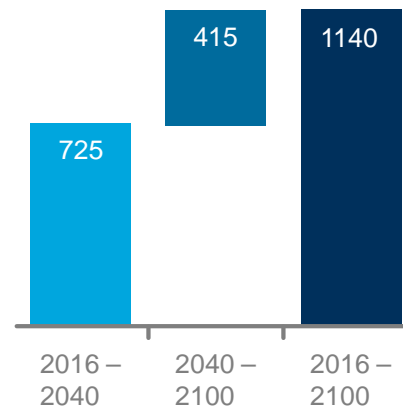


2°C IEA 450 SCENARIO

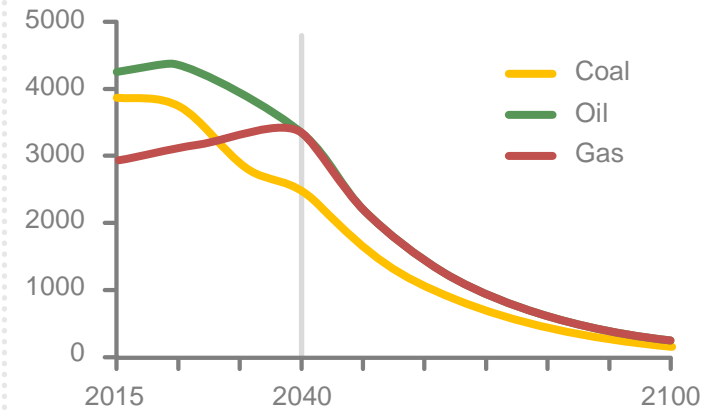
CO₂ Emissions Budgeted by Fossil Fuel (Gt CO₂)



Compliance with CO₂ Budget (GtCO₂)



Budgeted Fossil Fuel Demand toward 2100 (MTOE)

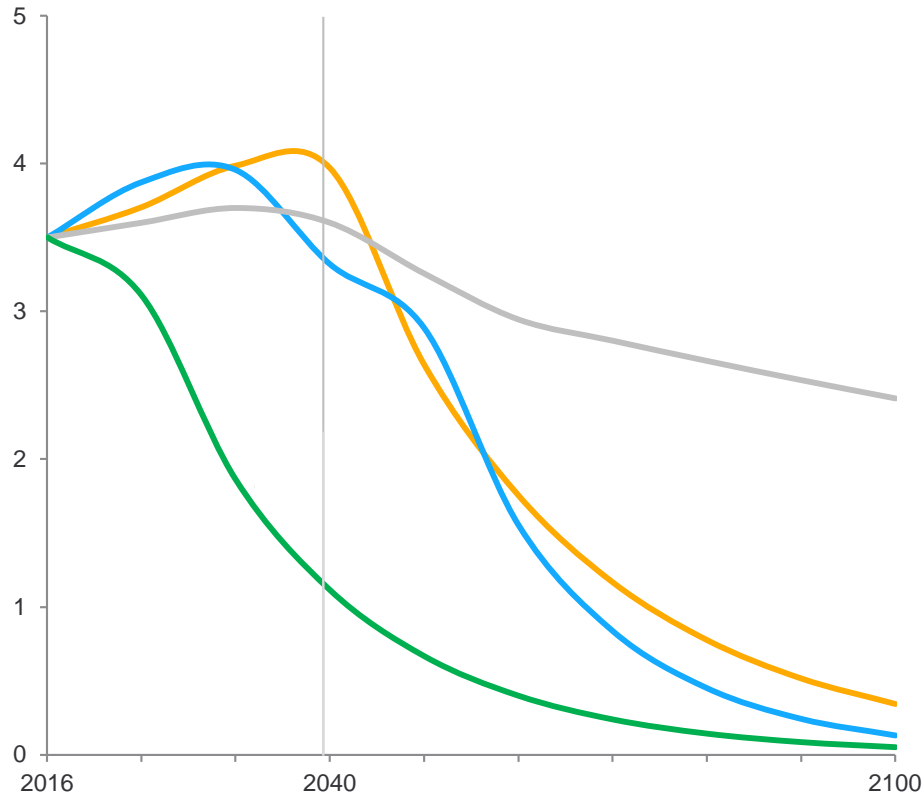


Natural Gas Demand in 2°C Scenarios



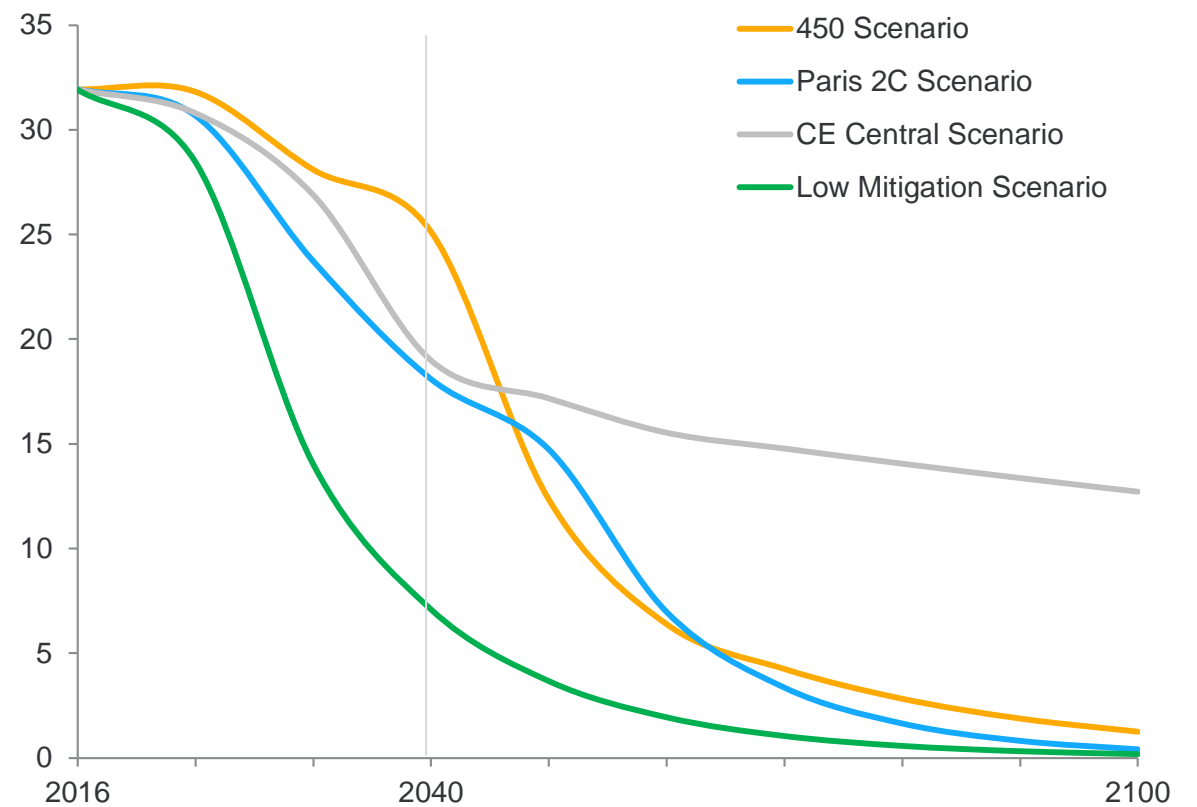
Natural gas demand by scenario

[TCM p.a.]



CO₂ emissions budget by scenario

[GtCO₂ p.a.]



- 450 Scenario
- Paris 2C Scenario
- CE Central Scenario
- Low Mitigation Scenario



USE-DRIVEN POLICIES

“The Bridge”



Power Industry
Opportunities



Downstream Economic
Development Opportunities



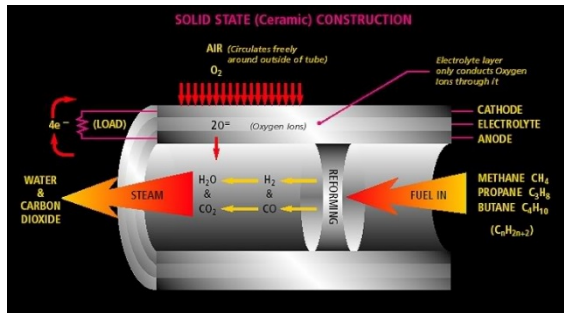
Energy Efficiency and
Low-Carbon Incentives

NEW TECHNOLOGIES

“Beyond the Bridge”

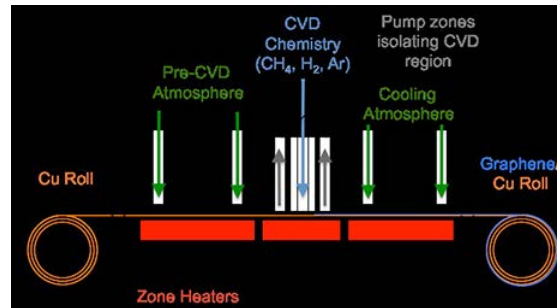


New Advances in Energy Conversion



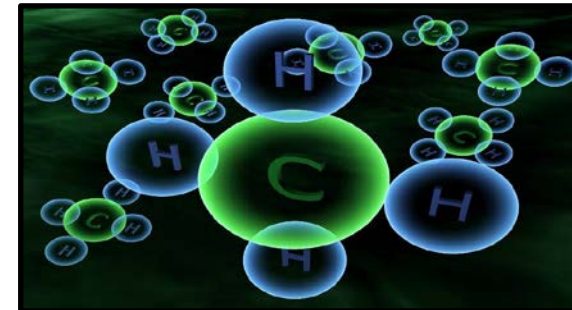
Solid Oxide Fuel Cells

New Products



Graphene Production

New Processes



Methane to Ethylene & Liquids