



Partnerships and Business Driven Actions: Methane to Markets

Methane to Markets

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6 October 2005



Key Messages

Public-private and intergovernmental partnerships, for example:

- CO2 Capture Project (BP, Chevron, Shell, Hydro, ENI, Petrobras, ConocoPhillips, Suncor)
- Carbon Sequestration Leadership Forum (CSLF)
- Methane to Markets

have the potential for facilitating:

- Demonstration projects and technology collaborations
- Technology transfer
- Progress towards widespread, commercial deployment of new technologies



Key Messages

Methane to Markets can further facilitate the development of technologies to reduce methane emissions and to remove barriers that will expand the market for gas

Key issues are:

- National policies
- Markets for gas
- Partnerships roles: government-to-government; government-to-private sector; company-to-company

Signposts



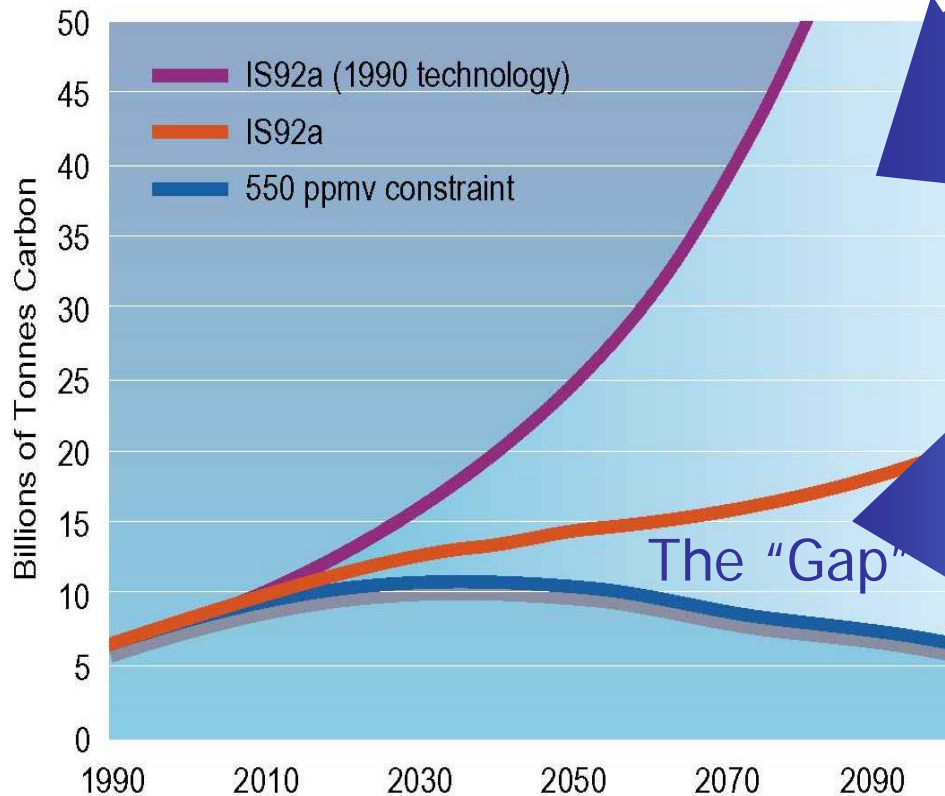
- The Kyoto Protocol entered into force 16 February 05
- EU Emissions Trading system began operation Jan 05
- EU market is seeing increasing trading activities. Forwards dominates now.
- Clean Development Mechanism Executive Board registered its first projects which, subject to monitoring provisions and certification, will likely see the issuance of credits in a year's time
- Some US states are continuing their plans on regional greenhouse gas emissions trading
- Canada is continuing its policy development, including trading. Canada signed agreement with automobile manufacturers to reduce emissions by 5.3 million metric tons per year by 2010.

Broad Portfolio of Energy and Emissions Reduction Technologies

Reducing methane emissions is an important part of reducing overall greenhouse gas emissions beyond any "business as usual" (IS92a) emissions scenarios to a world of 550 ppm greenhouse gas concentration.*

Assumed Advances In

- Fossil Fuels
- Energy intensity
- Nuclear
- Renewables



Source: Jae Edmonds, Pacific Northwest National Laboratory

* 550 ppm is the focus of United Nations negotiations for long term emissions reductions

Gap technologies

- CO2 capture & storage
- H2 and Advances in Transportation
- Biotechnologies (e.g., Bioenergy)



Technology and Policy Drivers

G8 Gleneagles Plan of Action on Climate Change, Clean Energy and Sustainable Development recognizes that advances in a portfolio of technologies are critical for the stabilization of greenhouse gas concentrations.

Technology common ground

- G8 nations disagree over the Kyoto Protocol
- G8 Plan of Action is the common ground.

In the CO₂ capture and storage technology area, G8 Gleneagles Plan of Action commits the nations to:

- Supporting the Methane to Markets Partnership and extending the World Bank's Global Gas Flaring Reduction Partnership beyond 2006



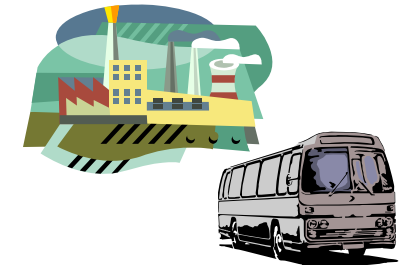
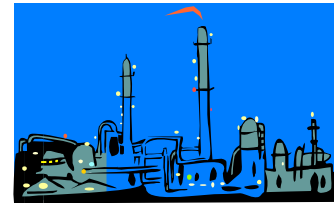
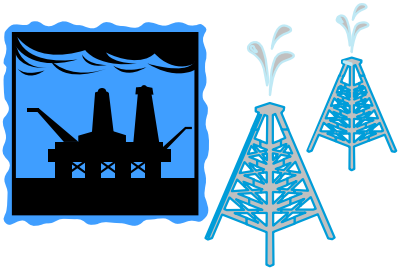
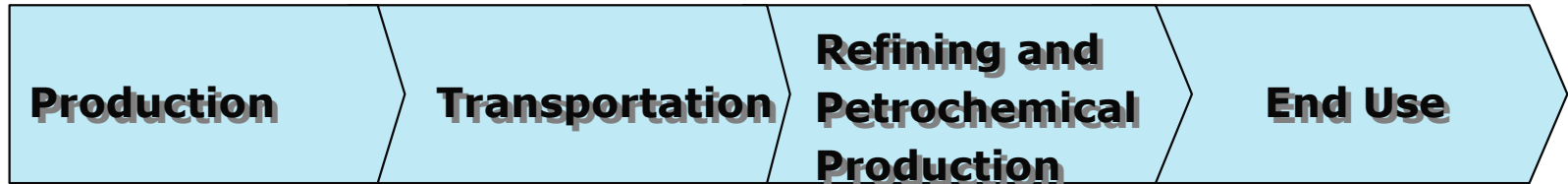
Business-Driven Actions on Greenhouse Gas Emissions Management

- **Strong Centralized Greenhouse Gas Management**
- **Management Processes and Tools Integrated to Business**
- **Carbon Markets Team**
- **Partnerships**

Importance of Climate Change Issue to Chevron



CO₂ and methane emission sources



- Combustion and rotating equipment, flaring, venting
- Gas associated with oil production

- Pipelines
- Vessels
- Vehicles

- Heaters
- Boilers

- Customer use of gasoline, diesel, and coal

- CO₂
- Methane

- CO₂
- Methane

- Primarily CO₂

- CO₂

Sources

Emission

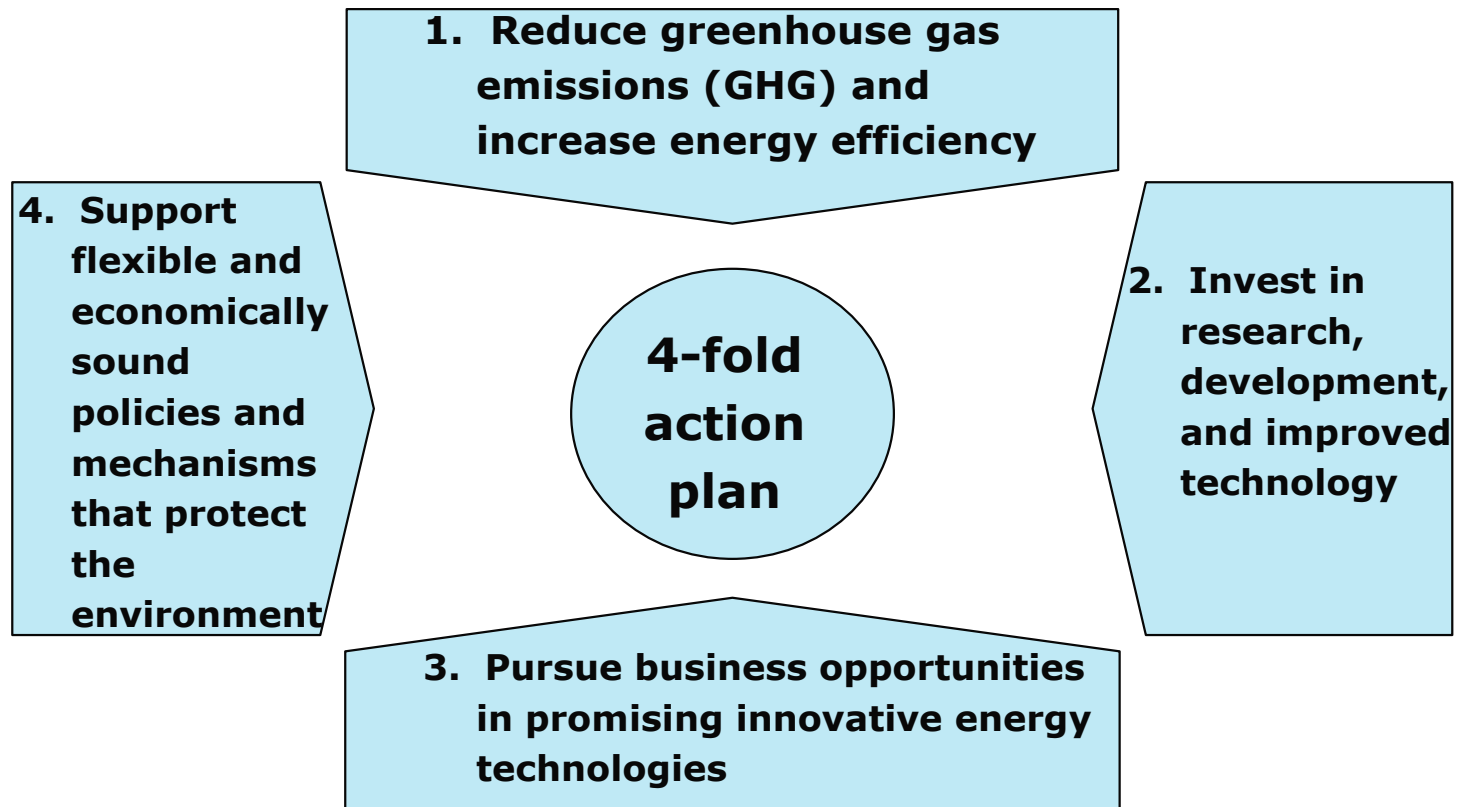
Four-Fold Plan of Action

Position

- We at Chevron Corporation are responding to increasing climate change concerns by integrating an action-based approach into our business strategy

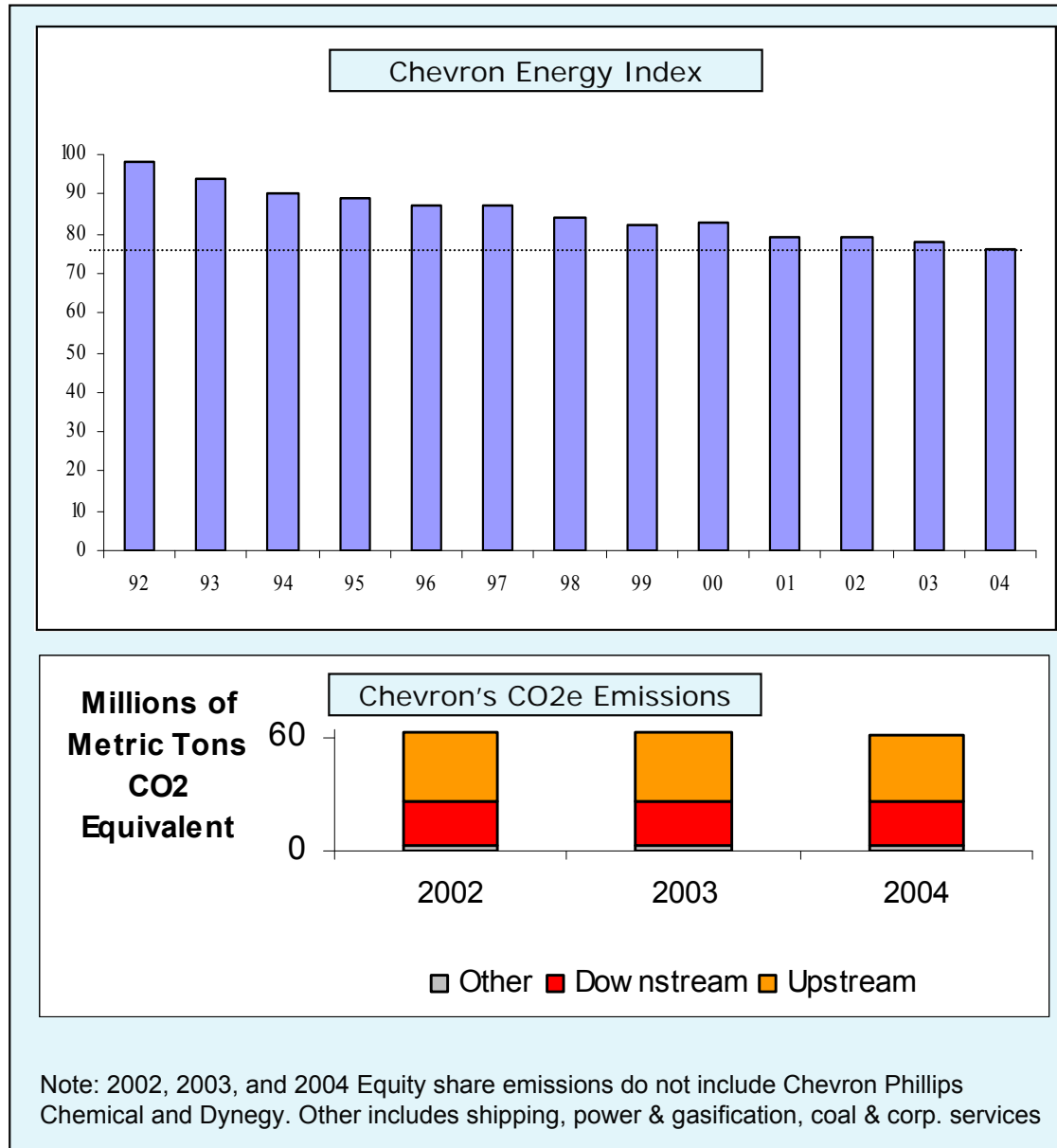
Plan

- 4-Fold Plan predicated on ***ACTION***





Measurable Results



- Chevron's energy efficiency improved 24% from 1992. U.S. refinery plans an additional 10% improvement by 2012.
- Chevron's operating companies have set greenhouse gas emission goals for 2005, and forecast 2005-07
- Greenhouse gas emissions accounting has become standardized – Chevron's SANGEA™ software has the key role
- Capital projects are required to project greenhouse gas emissions and analyze mitigation options.
- Methane is approximately 11% of emissions.
- Chevron is a member of the US EPA's Natural Gas Star Program.

Greenhouse Gas Emissions Management at Chevron Corporation: Path Forward



World Class Performance



Long Term
Forecasts

External
Reporting

Standardized
Accounting

Focused Improvement



Forecasting Tools

GHG Planning in Capital Projects

Sharing Best Practices

Signpost and Scenario Analysis

Technology Assessment Tools

Foundation

SANGEA™

Data Collection

Emissions Trading

Energy Efficiency



Partnerships

Chevron continues to:

- Execute a Global Gas Strategy across the Gas Value Chain
- Foster climate change-related Joint Industry projects
- Encourage business units' actions in support of Chevron's Four-fold Action Plan -- several examples:
 - The Gorgon Project
 - Chevron Energy Solutions
 - Chevron Technology Ventures
- "Practical Hydrogen" – hydrogen infrastructure development

Linking the Gas Value Chain

Forging strong links all along the gas value chain is critical to the commercialization of the significant volumes of remote natural gas resources throughout the world.

Upstream



Liquefaction



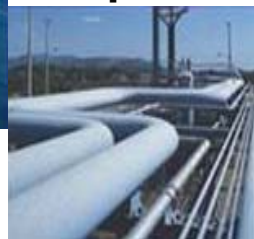
Shipping



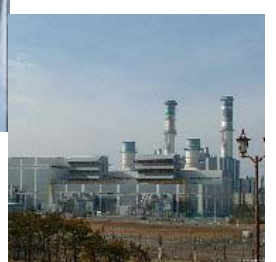
Regasification



Marketing & Pipelines



Power



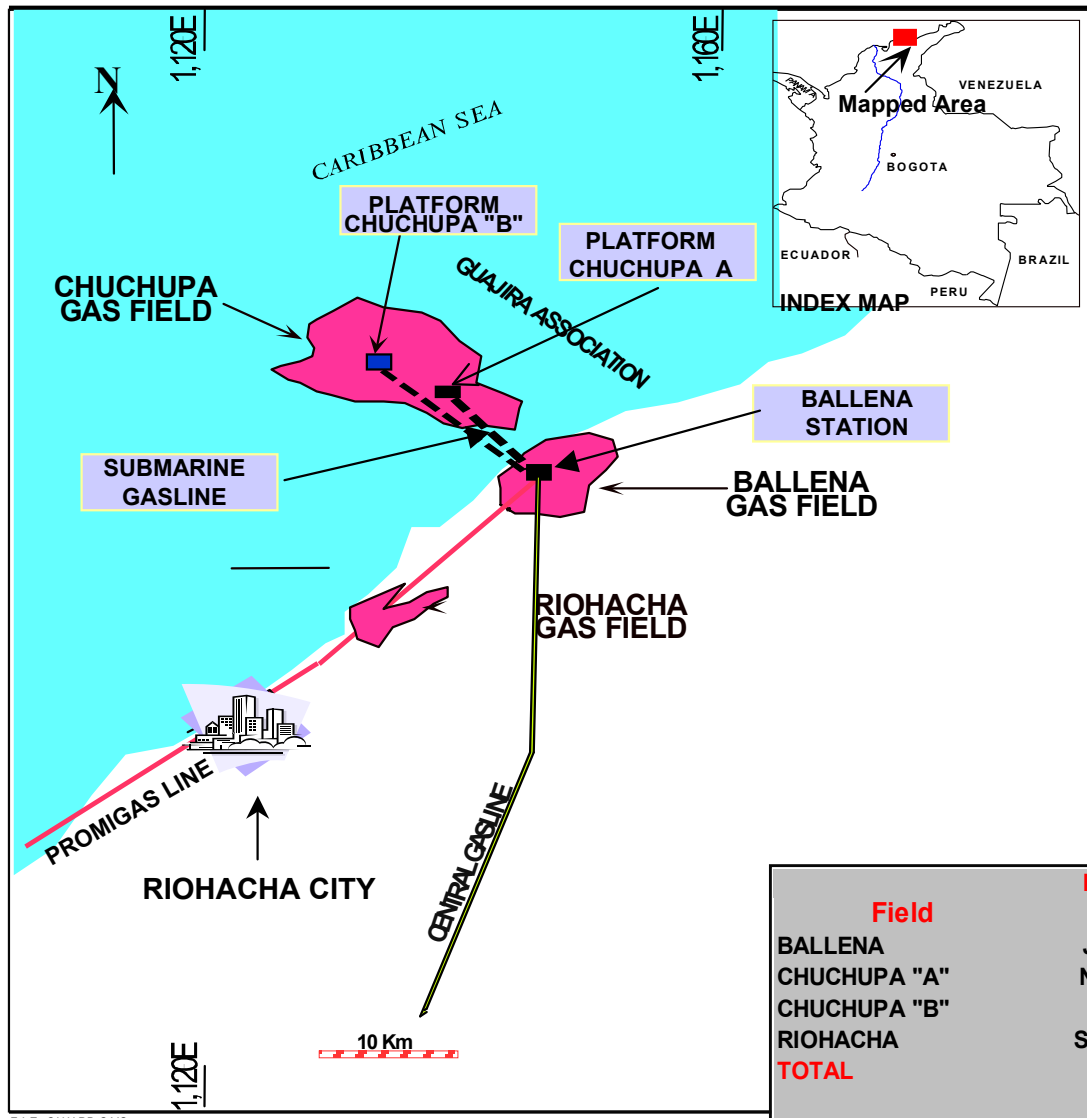
Climate Change Related Joint Industry Projects



- CO₂ Capture Project
- CO₂ Cooperative Research Center
- International Energy Agency - Weyburn
- Gulf Coast Carbon Center
- MIT's Carbon Sequestration Initiative
- WestCarb (U.S. Dept. of Energy Regional Partnership)
- Global Gas Flaring Reduction Partnership
- Industry Consortia: API, IEA, IPIECA, CO2NET



Chevron's Colombia Production Fields



	Distances (miles)
Rcha City - Chu B Platf.	19
Rcha City - Chu A Platf.	17.5
Rcha City - Ball Stat.	16.5
Rcha City - Rcha Stat.	5
Ball St. - Chu A Platf.	7.2
Ball St. - Chu B Platf.	11
Chu A Platf. - Chu B Platf.	4.5

Field	Discovery Date	Active Wells	Production (MMscfd)	
			Current	MAX. CAP.
BALLENA	JUN. 1973	12	67	67
CHUCHUPA "A"	NOV. 1973	9	171	171
CHUCHUPA "B"	-	3	267	267
RIOHACHA	SEPT. 1975	1	0	0
TOTAL		25	505	505

FILE: CHUPB.CVS

Chevron's Colombia Production Fields

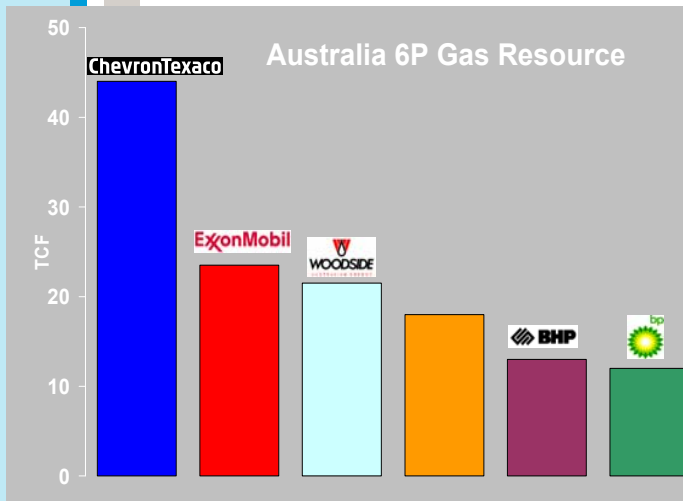
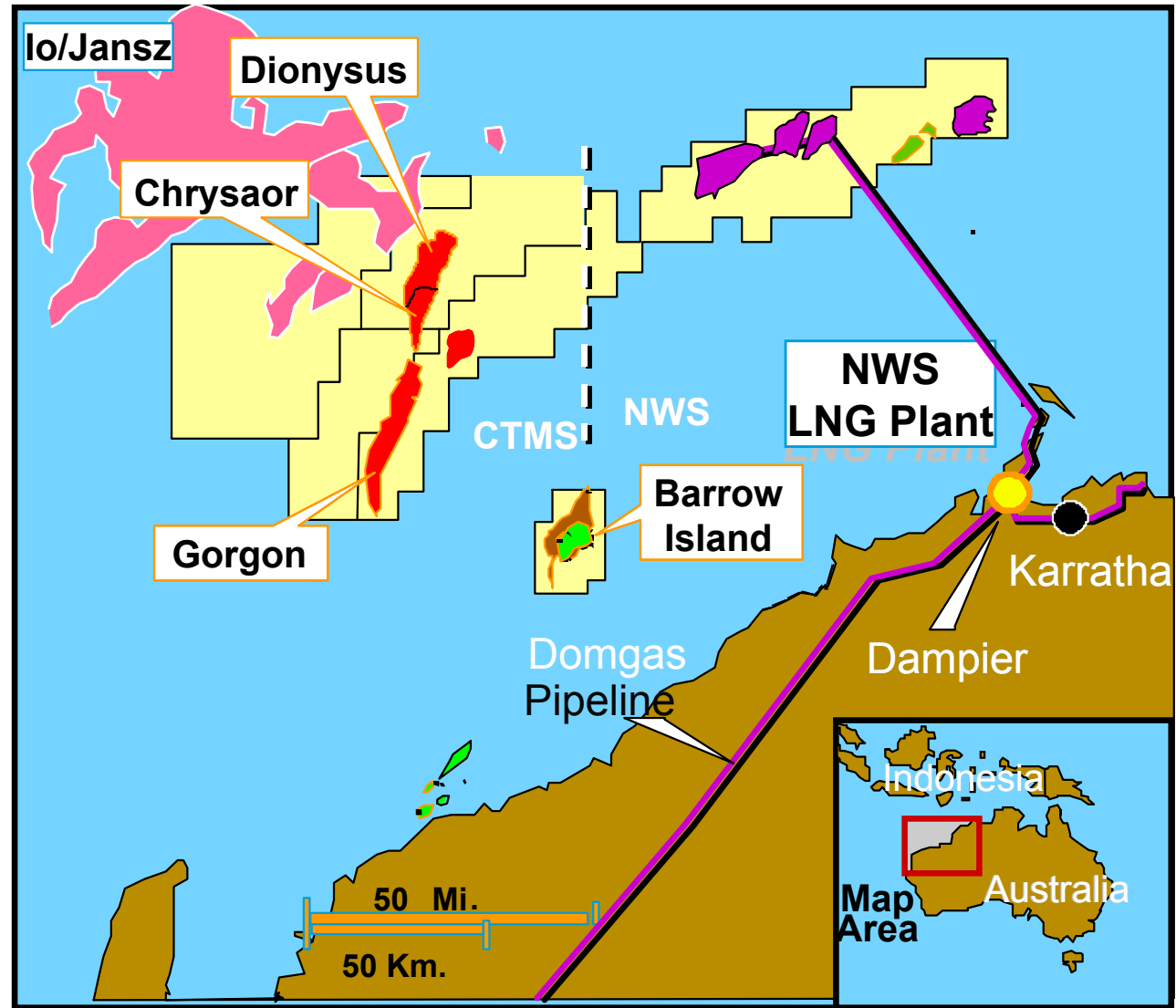
Fugitive Emissions Inspection:

- Regular leak detection – Poliken Pipeline Coating
- New project to define the instrument air and utility // starting air requirements



Australia: Vast Resources Offer Clean Fuels Promise and GHG Advances

- CVX is 1/6 Equity Owner in NWS LNG Venture
- CVX is also Operator and Lead Developer of Gorgon LNG with more than 40 TCF in Greater Gorgon area.



Greenhouse Gas – the Gorgon commitment




Gorgon CO₂ sequestration will be the largest such project in the world.

It will be managed through:

- Greenhouse Gas Management Strategy
- Environment, Social and Economic Review commitments
- Greenhouse Gas Management Plan
- Environmental Impact Assessment process (EIS/ERMP)

"Greenhouse gas management is part of our business"



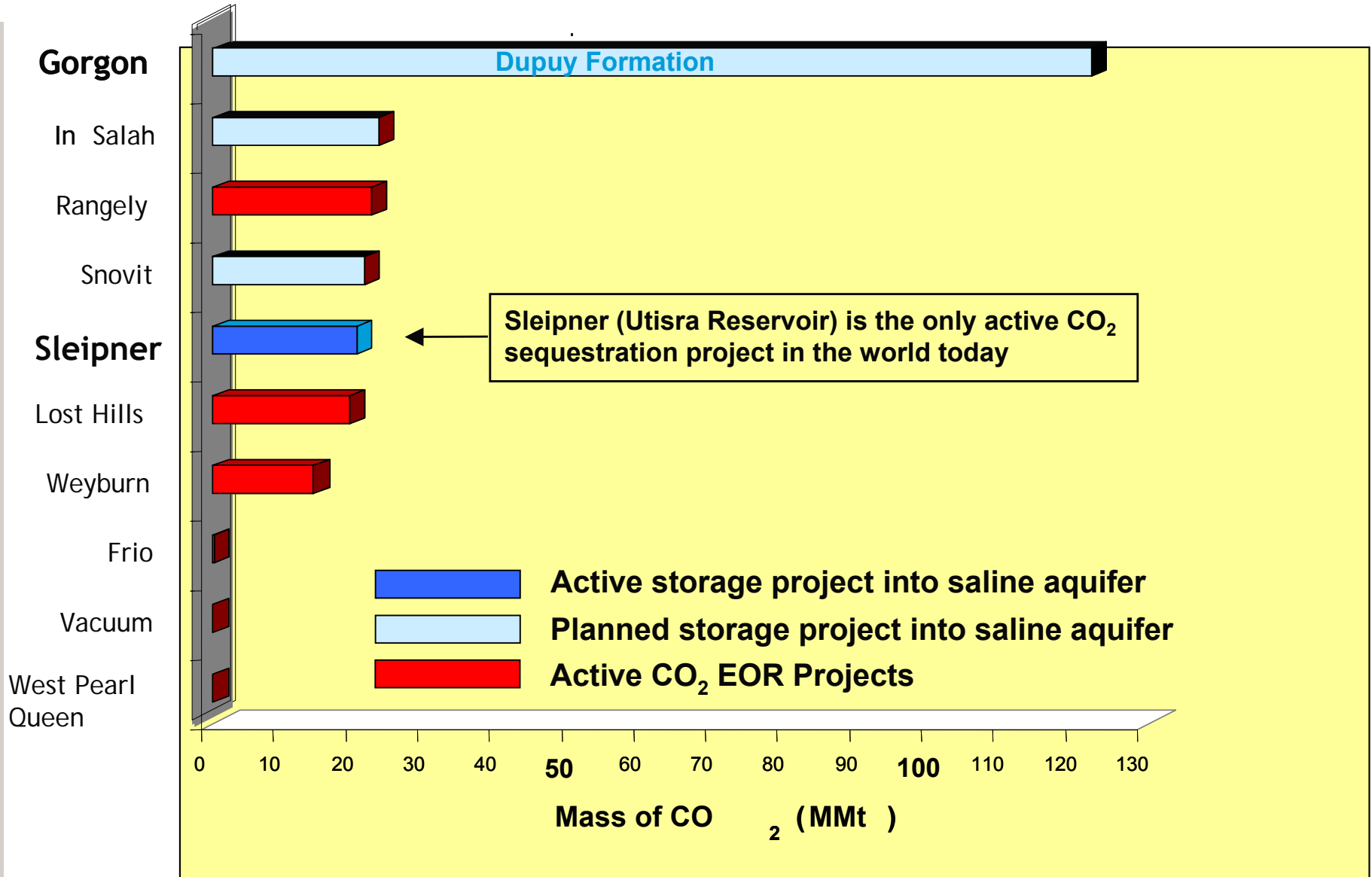
Gorgon Gas Development Greenhouse Gas Management Strategy

The Gorgon Development Greenhouse Gas Management Strategy for a Barrow Island development is to:

- Demonstrate via lifecycle analysis that a Gorgon gas development and LNG export results in a net reduction in global greenhouse gas emissions relative to other fossil fuel alternatives.
- Design the production facilities to incorporate current best practices in thermal efficiency and greenhouse emission control where practicable.
- Develop a project to re-inject the removed reservoir CO₂ into the Barrow Island Dupuy saline reservoir, unless it is technically infeasible or cost-prohibitive. This will involve:
 - Pursuing a stepwise process to: develop a reservoir CO₂ re-injection project, demonstrate technical feasibility, and ensure costs to the project are not excessive.
 - Selling treated gas to meet domestic gas customer requirements and re-inject the removed reservoir CO₂.
 - Commencing re-injection as soon as practicable after the processing facilities commissioning and start-up process.
 - Implementing re-injection of reservoir CO₂ by installing a single train of injection equipment, sized for the full volume of reservoir CO₂.
- Investigate potential synergies with existing Barrow Island operations and implement measures that minimise greenhouse emissions and enable full use of associated gas production where practicable.
- Pursue projects and opportunities which provide net conservation benefits and enhance greenhouse gas removal from the atmosphere.
- Continue existing funding for greenhouse gas related research and development projects such as CRC's and technological research.
- Review options for funding additional value-added research and development or demonstration projects.
- Pursue potential opportunities for external sale or use of separated reservoir CO₂ as a chemical feedstock or enhanced oil recovery agent.
- Develop a contingency plan that could provide a partial offset for reservoir CO₂ if a sequestration project proves infeasible. Options may include:
 - Maturing alternative re-injection sites that could be developed in the future such as a depleted gas reservoir.
 - Creation of emission reductions or offsets external to the Gorgon gas development.
 - Sequestration opportunities such as forestry.
 - Additional research funding.
- Meet the commitments within the LNG Action Agenda including the revision of the existing Gorgon Greenhouse Challenge Cooperative Agreement.
- Continue to advocate increased use of gas based fuels, in preference to more carbon intensive options, to reduce greenhouse emissions.
- **Participate constructively in the development of greenhouse policy at both the State and Commonwealth level.**

Paul Oen
Gorgon Area General Manager

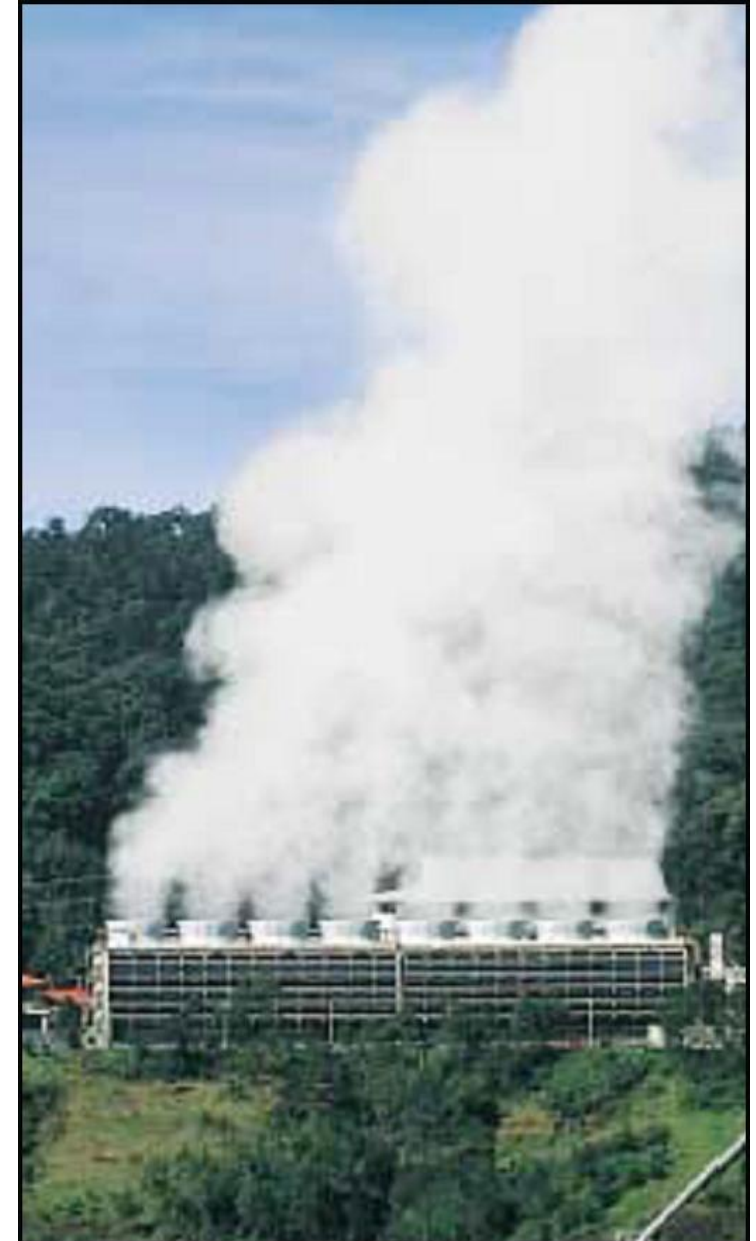
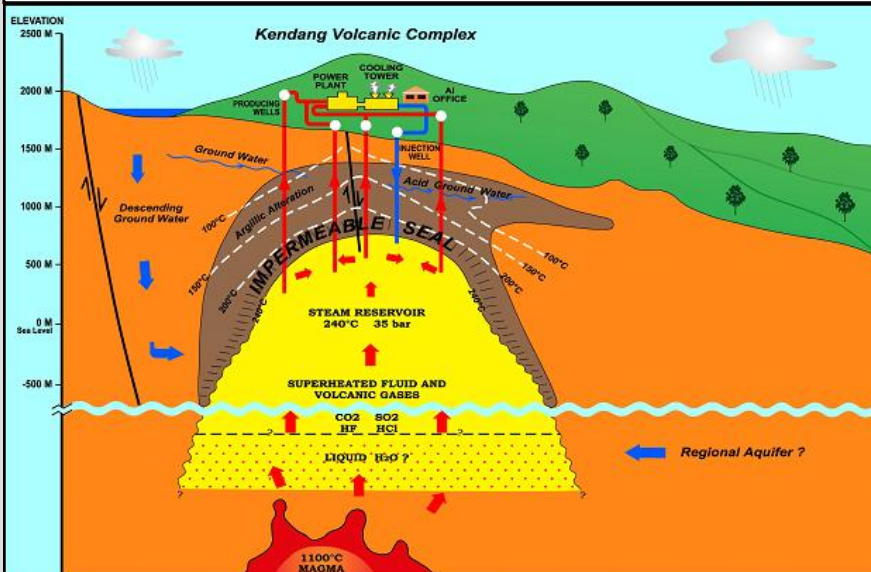
Comparison of Global CO₂ Re-Injection Projects



Darajat Geothermal Expansion

Darajat

- **110 MW Expansion of Darajat geothermal power project**
- **Resource operated by Chevron Energy Indonesia Ltd (CTEI)**
- **Will help meet electricity demands of Java, Madura and Bali, where supply shortages are anticipated**
- **Darajat's geothermal resources are abundant, clean, renewable**
- **Will help Indonesia avoid more than ~400,000 tons per year of CO₂ emissions**



Chevron Energy Solutions – Energy Efficiency Project (US Postal Service, West Sacramento, CA)





Chevron Energy Solutions - Solar Photovoltaic Installation (Public Library, City of Richmond, CA)



Technology Ventures: Renewable Energy Systems

Solar Mine project in the Midway-Sunset heavy oil field



**Renewable energy systems
integrated into oil field operations**



Advanced Batteries

- The power behind hybrid vehicles
- COBASYS has completed construction of an NiMH Battery Plant



- COBASYS signed a cost-sharing contract to continue the development of NiMH batteries under the sponsorship of the U.S. Department of Energy's FreedomCar initiative



New Manufacturing Facility
Springboro, Ohio

U.S. DOE Hydrogen Fleet & Infrastructure Demonstration & Validation Project



5 year project to showcase practical application of H2 technology. Chevron is consortium leader and fuel supplier; Hyundai-Kia Motors the vehicle supplier; and UTC Fuel Cells will supply the FC stacks



Develop and demonstrate safe, convenient, reliable H2-based distributed power generation, FCVs and vehicle fueling infrastructure



Educate key audiences about H2 as potential fuel for transportation and power generation

Sites and fleet operators: HATCHI, SoCal Edison, AC Transit and U.S. DOD



Fueling for up to 32 H2 FCVs

Integrated Codes & Standards, Education & Outreach Plans

Opportunities in Early Markets for Hydrogen



High-Quality Distributed Power



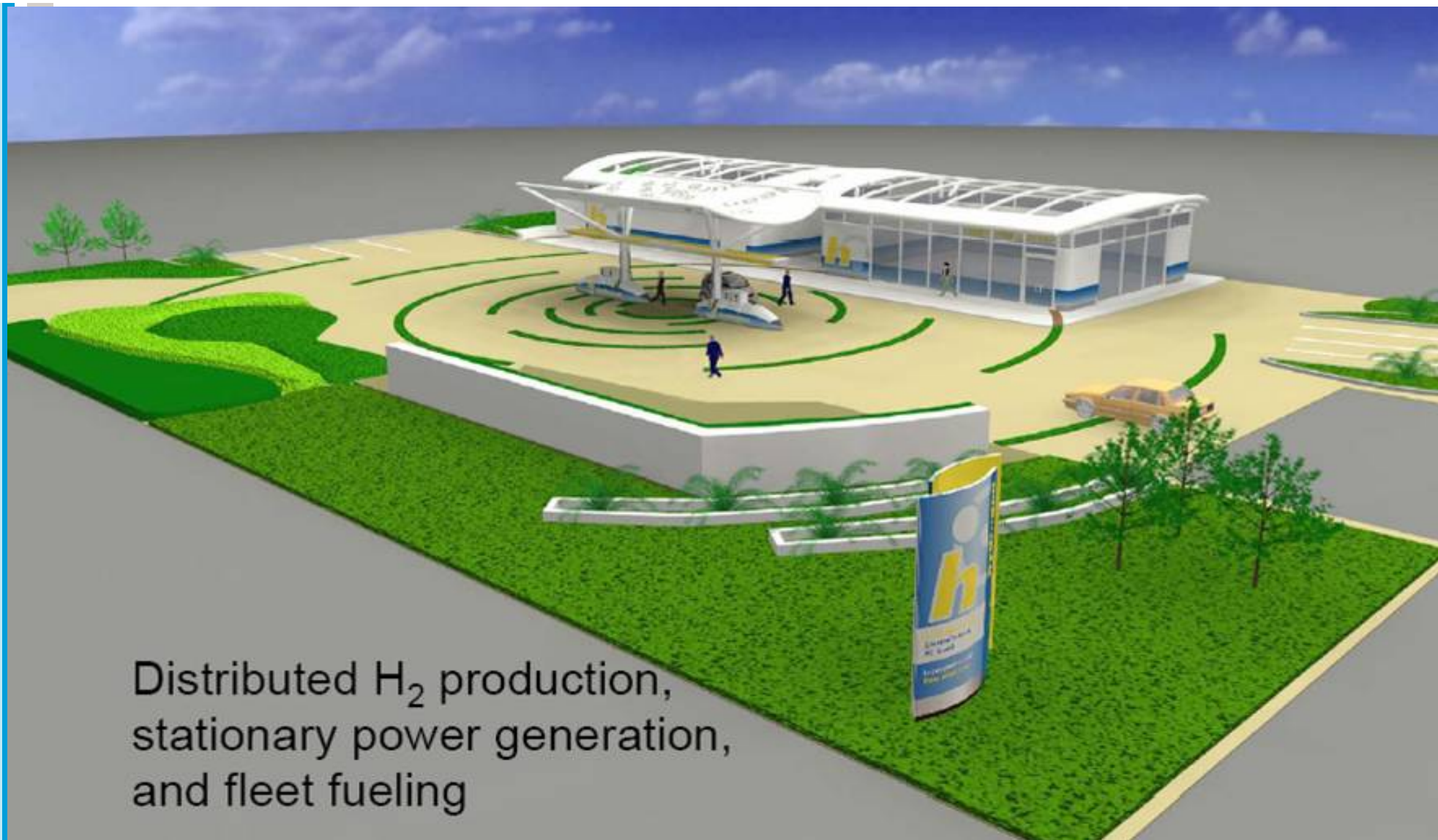
- Fuel cell installation in Bellaire, TX and San Ramon, CA

Vehicle Fleets



- AC Transit Fuel Cell Bus Program
- US Department of Energy Project

The Hydrogen Highway: moving to the next phase



Distributed H₂ production,
stationary power generation,
and fleet fueling

The Hydrogen Highway: moving to the next phase (18 February 2005)



Chino, California



Hydrogen Fueling Dispenser



Unveiling at Chino, California



Groundbreaking at Orlando, Florida





Business-Driven Actions on Greenhouse Gas Emissions Management

Strong Centralized Greenhouse Gas Management

- Executing the Four-Fold Action Plan
- Climate Change Steering Council

Management Processes and Tools Integrated to Business

- Carbon management systems integrated into business planning
- Multiple emissions-reducing project activities

Carbon Markets Team

- Centrally coordinates trading and credit activities worldwide

Partnerships

- Key opportunity areas to address technology and business development