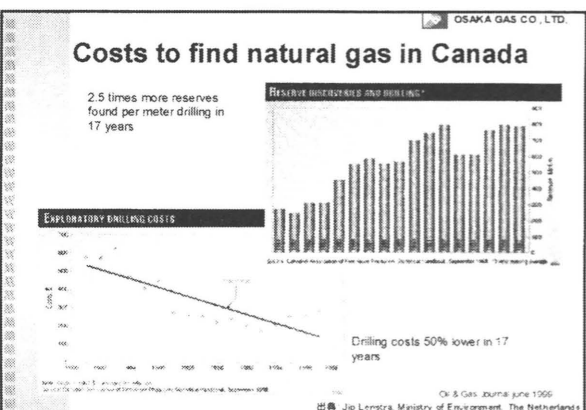
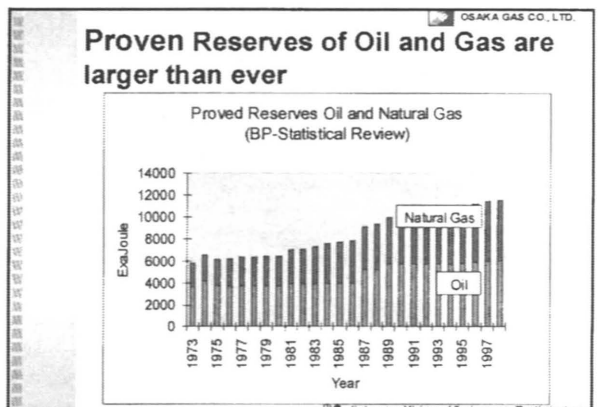






- ◆◆内容◆◆
1. 天然ガスと水素に対する考え方
欧米、特にオランダの紹介
 2. LNGチェーン
 3. 天然ガスからの水素製造
 4. 天然ガス改質型オンサイト水素製造装置
 5. 新規水素製造技術
 6. まとめ

- ### Four important misunderstandings
- Natural gas resources will be exhausted soon
 - Climate Change can be ignored as long as scientific evidence is incomplete
 - The hydrogen age is something for the very long term
 - Solutions for the Climate Change problem will greatly change our society
- 出典 Jip Lemstra, Ministry of Environment, The Netherlands



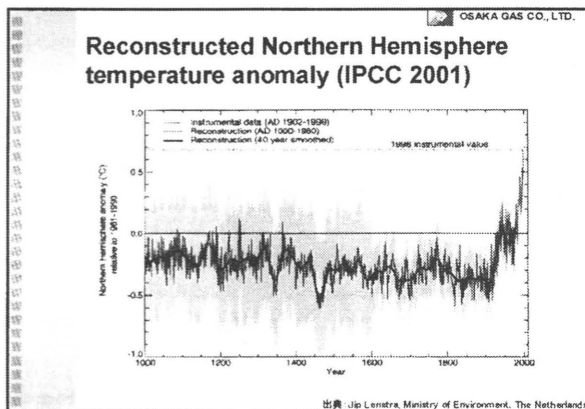
- ### Natural gas resources
- Provided that:
 - ☐ Technology development continues
 - ☐ Unconventional gas resources are to be developed
 - Then:
 - ☐ Natural gas will be abundant for centuries
- 出典 Jip Lemstra, Ministry of Environment, The Netherlands

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Four important misunderstandings

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出典 Jip Lenstra, Ministry of Environment, The Netherlands



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Climate Change

- Climate Change policy is a political reality
- As long as global surface temperature is rising...
- Stabilisation of GHG-concentrations demands deep CO₂ reductions, especially in industrialised countries

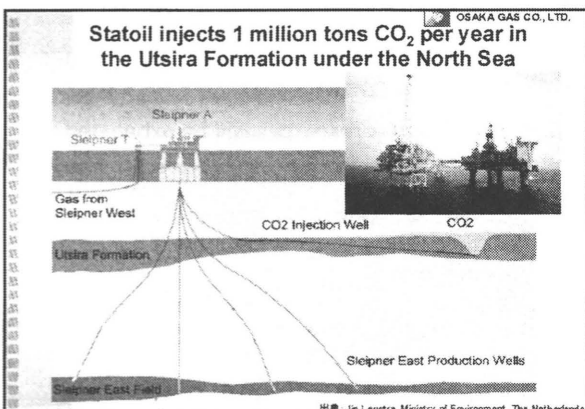
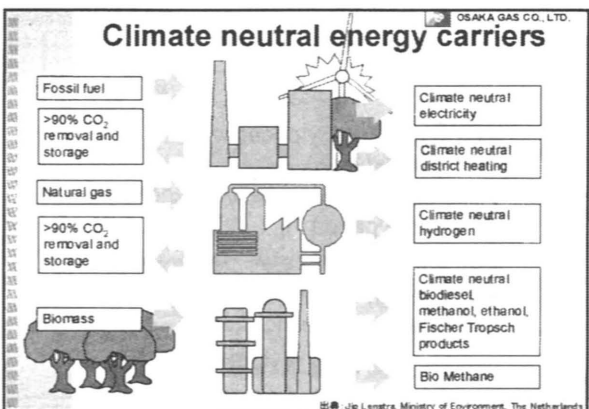
出典 Jip Lenstra, Ministry of Environment, The Netherlands

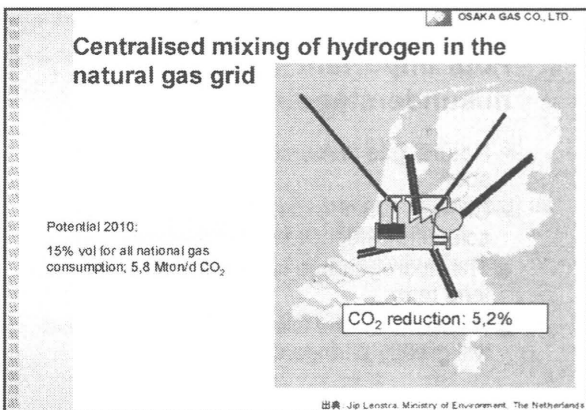
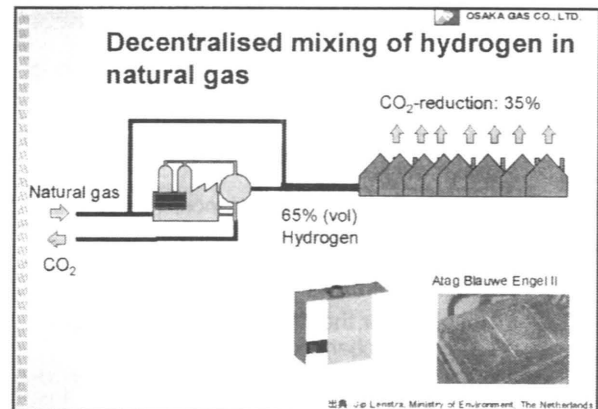
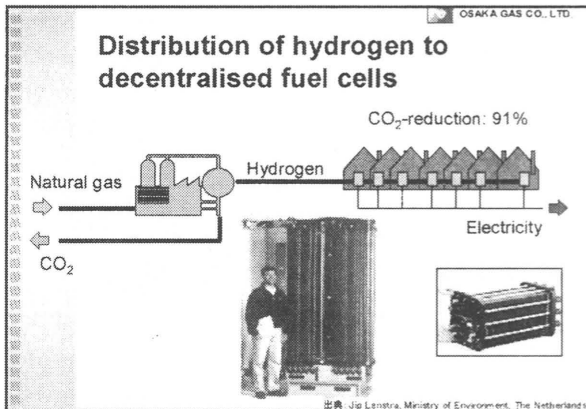
OSAKA GAS CO., LTD.

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出典 Jip Lenstra, Ministry of Environment, The Netherlands





- OSAKA GAS CO., LTD.
- ### CO₂ removal and storage can extend the fossil age
- There is no shortage of fossil fuels and CO₂ storage capacity is large
 - Climate neutral electricity can be produced at affordable costs
 - Hydrogen can be an innovative climate neutral energy carrier soon
- 出典 Jip Lenstra, Ministry of Environment, The Netherlands

- OSAKA GAS CO., LTD.
- ### Four important misunderstandings
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- 出典 Jip Lenstra, Ministry of Environment, The Netherlands

- OSAKA GAS CO., LTD.
- ### Structural changes?
- End user energy prices will rise by 25% (in the Netherlands)
 - The economy may grow by 300% during the same period
 - Structural changes will be very small
 - The energy supply structure however will change completely!
- 出典 Jip Lenstra, Ministry of Environment, The Netherlands

Four important misunderstandings

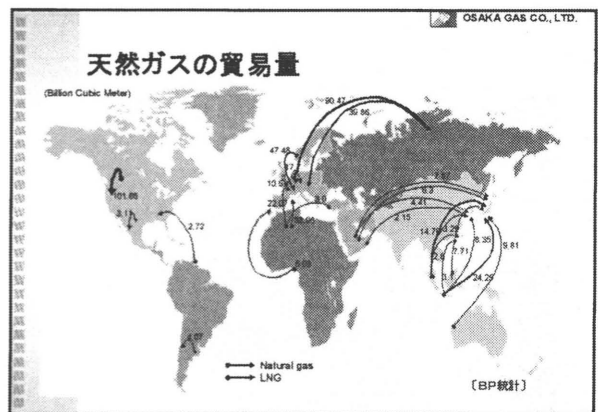
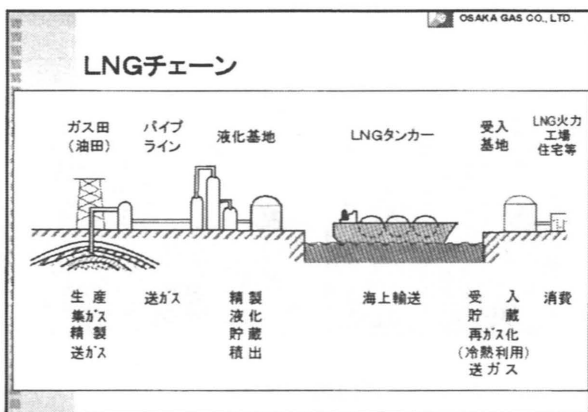
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出典: Jip Lemstra, Ministry of Environment, The Netherlands

Technical Coordinating Committee

- WOC1: Exploration, Production and Treatment of Gases
- WOC2: Underground Storage
- WOC3: Liquefied Gases
- WOC4: Transmission
- WOC5: Distribution
- WOC6: Utilization of Gases for Domestic, Commercial and Transportation Sectors
- WOC7: Industrial Utilization and Power Generation
 - SG7.1
 - SG7.2
 - SG7.3
 - SG7.4 Hydrogen – A future business option for the gas industry?
- WOC8: Environment, Safety and Health
- WOC9: World Gas Prospects, Strategies and Economics
- WOC10: Gas and Developing / Transitional Economics

International Gas Union (IGU)



世界の水素消費量*

(億m³)

アンモニア製造	2,479
リファイナリー	964
メタノール製造	347
その他	79
流通販売	105
合計	3,974

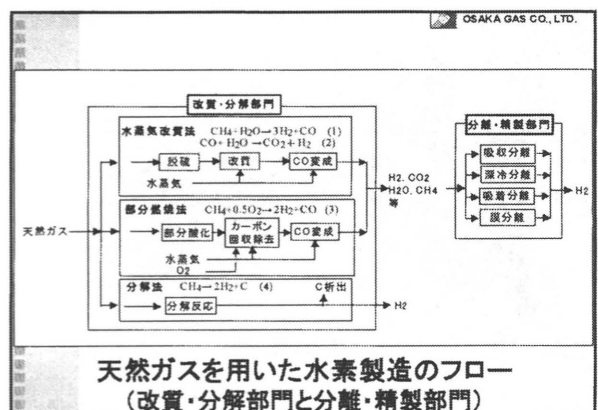
1996年データ
Chemical Economics Handbook 1998-SRI International

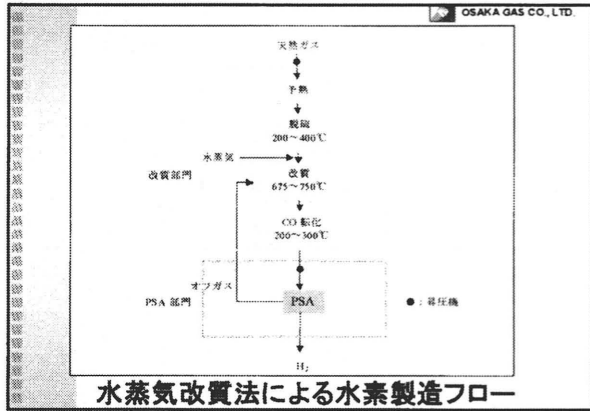
日本の水素消費量

(億m³)

アンモニア製造	35
リファイナリー	109
その他	16
流通販売	2
合計	162

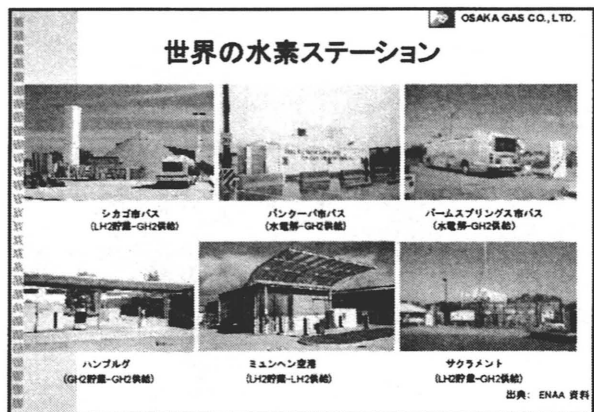
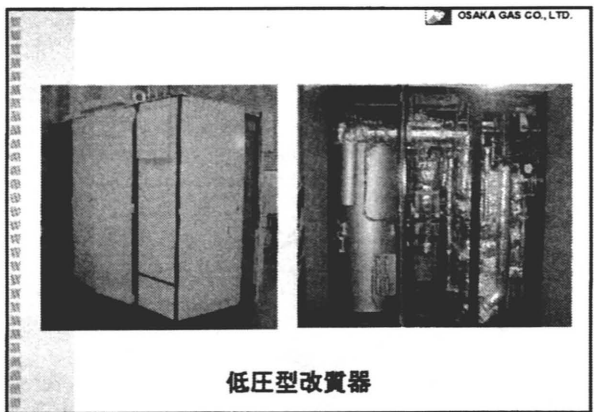
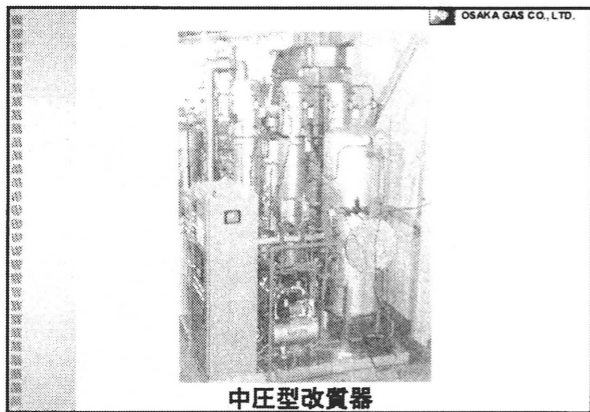
現状の水素消費量

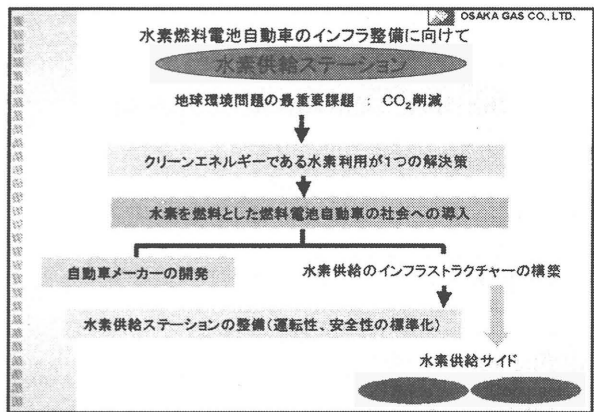
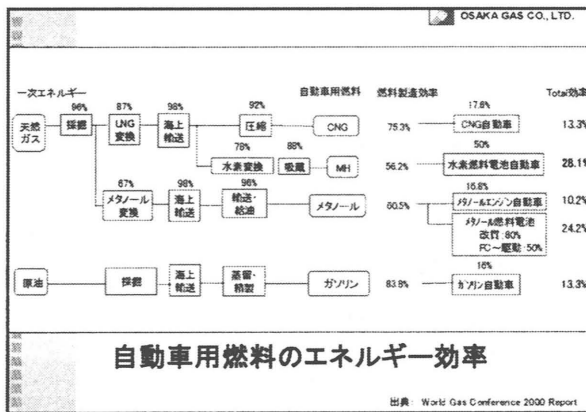
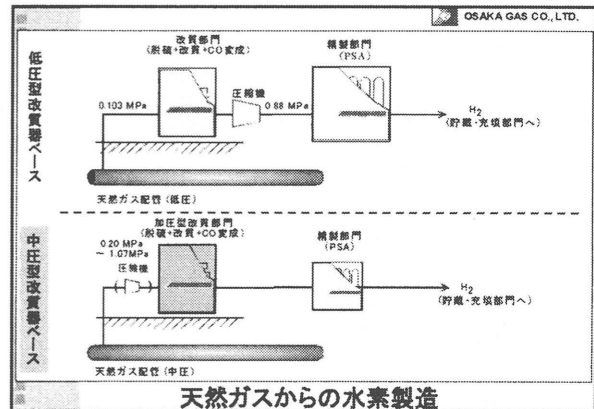
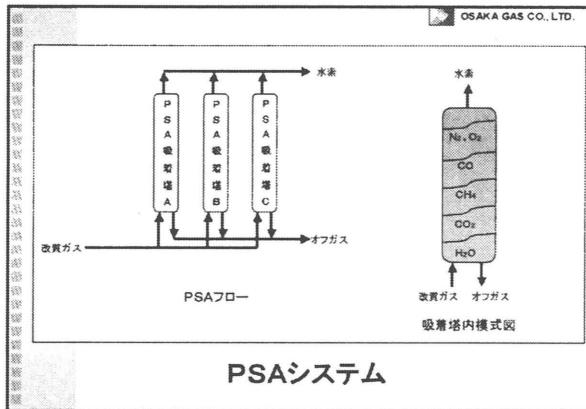




工業用水素製造装置と燃料電池改質器の特徴

	工業用水素製造装置	燃料電池用改質器
運転パターン	連続運転	起動・停止、負荷変動多い
起動時間	—	短縮要請 大
反応圧力	高圧	低圧
水素純度	高純度(99.999%以上)	燃料電池被毒成分がなければよい
量産効果	小	大
設計目標	高信頼性、水素製造コスト小	発電効率大、コンパクト





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天然ガス改質型水素供給ステーション開発課題

オンサイトで安全に水素を製造、貯蔵、車へ充填し、燃料電池自動車の燃料として実用化できることを実証する。

<技術面>

- 水素発生装置と水素貯蔵ユニットの連携システムの確立
- 水素吸蔵合金自動車への急速充填法の確立 (H₂ 25Nm³を10分で充填)
- 将来の実用的ステーション設計のために必要な課題の抽出

<安全面>

- 水素供給ステーションの技術指針作成のための知見取得
- 水素供給ステーションの安全対策システムと安全管理方法の検討

2月7日竣工記念式典

OSAKA GAS CO., LTD.

燃料電池車と水素ステーションの導入目標

燃料電池実用化戦略研究会の燃料電池車導入目標

年	～2010	～2020
導入目標	50,000台	500万台

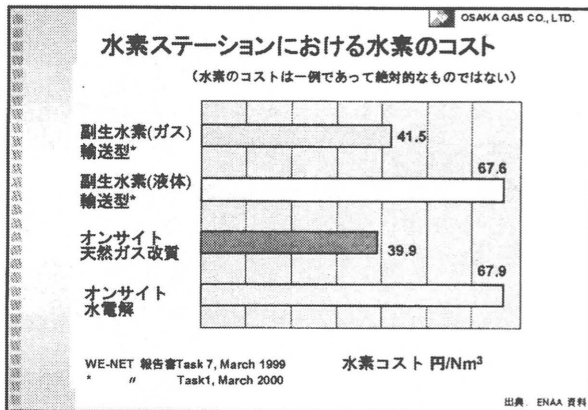
2020年の水素消費量と水素ステーション設置数予測

- 水素消費量: 37.5 億Nm³/年
- 水素ステーションの設置数: 4,000

水素ステーションの規模 (車1台の充填量: 30Nm³)

水素製造量	貯蔵量	1日の充填台数	1ヶ所の受持台数
200 Nm ³ /h	2,400 Nm ³	160 台	1,152 台
300	3,600	240	1,728

出典: ENAA 資料



純水素スタンドのオンサイト、オフサイトの規定

年度	2010	2020
普及台数	5,000	50,000
位置付け	黎明期	導入初期
スタンド1箇所 当たりの台数 (1日当たり)	10台	31台
オフサイト	100%	100%
オンサイト	0%	0%

出典: WE-NET WG2資料

