Enhanced Oil Recovery of OMV in the Vienna Basin

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Participation in IEA

Working Party: Fossil Fuels

Collaborative Project on Enhanced Oil Recovery
Annual Workshop & Symposium

Tasks for IEA Workshop

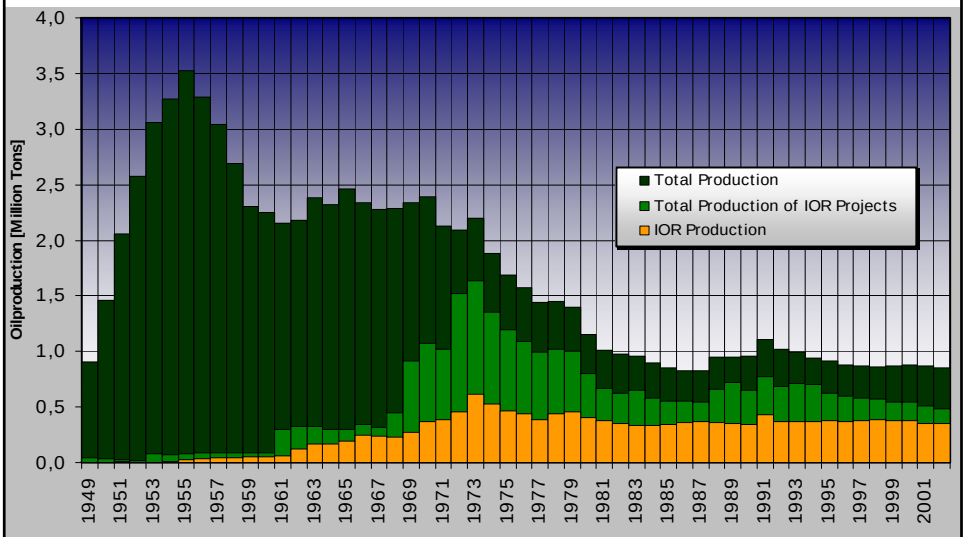
A	Studies of Fluids and Interfaces in Porous Media
B	Fundamental Research on Surfactants and Polymers
C	Development of Techniques for Gas Flooding
D	Thermal Methods
E	Dynamic Reservoir Characterization
F	Emerging Technologies

Topic for Symposium: organizer‘s choice

Presentations at Workshops and Symposia

Year	Venue	Author	topic
1984	Paris	H. Schmied et al.	Method of Investigations for CO_2-Flooding Processes
1988	Fredensborg	N. Philippovich et al.	Water Core Flooding for Polymer EOR- Investigations: Effect of Core Aging, Oil Type and Test Conditions
1988	Fredensborg	L Bräuer et al.	High Pressure Flood Experiments with CO2 and Automatic Data Acquisition
1989	Stanford	N. Philippovich et al.	Laboratory Tests for a Proposed Polymer Pilot
1991	Bath	G Rauth	Evaluation of Directional Permeabilities in a Polymer Pilot Area by Pulse Testing
1991	Bath	E Rieder	Selection of a Pilot Area in the Oil field Matzen and Measures to Develop a concept for Polymer Flooding
1993	Salzburg	N Philippovich	Polymerflooding in the Matzen Oil Field
1993	Salzburg	E Rieder	A Review of IOR-Activities in the Vienna Basin
1994	Bergen	N Philippovich	Final Analysis and Consequences of the Matzen Polymer Project
1997	Copenhagen	K. Potsch	Experimental Evaluation of Condensate Drop Out
1998	San Francisco	N. Philippovich	Injection Water Treatment: Problems and Experiences
1999	Paris	U. Bregar	Reservoir Engineering Aspects of Cyclic Gas Storage as a Tool of Improved Oil Recovery
2000	Edinburgh	N. Philippovich et al.	Water Conditioning for IOR: Field Implementation
2001	Vienna	N. Philippovich et al.	Watered-out Wells: Experiences with Sodium Silicate as Plugging Material
2001	Vienna	K. Potsch	Mobilizing the Liquid Drop-Out of Condensate Reservoirs
2002	Venezuela	K. Potsch et al.	Selecting Hochleiten Field for EOR
2003	Regina	K. Potsch et al.	Gas Injection Pilot in the Hochleiten Field

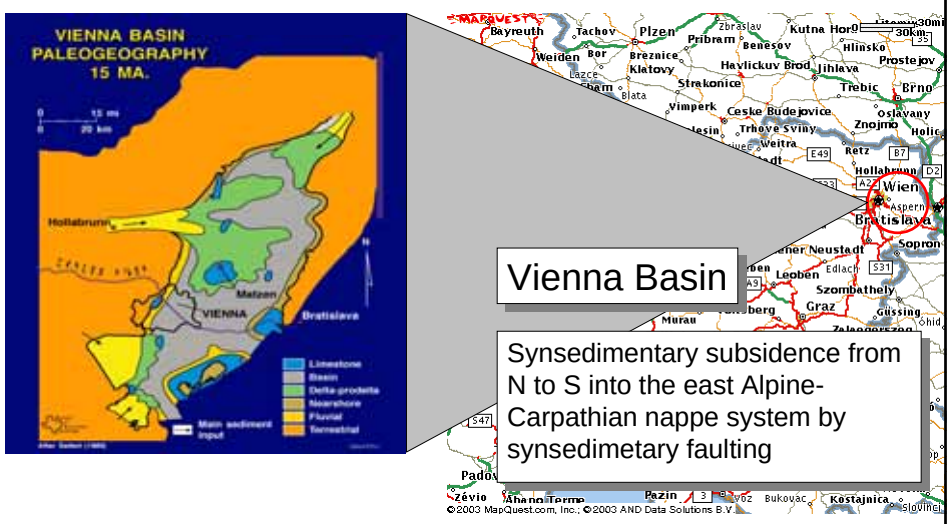
Introduction



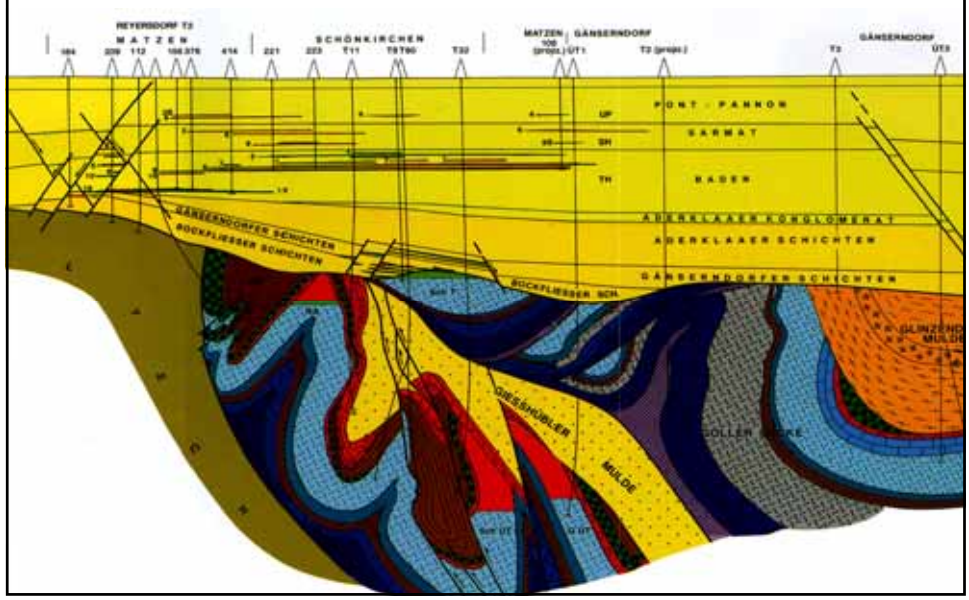
OMV‘s Oil Production

	2002		2003	
production	t	%	t	%
primary	456,000	53.4	483,800	56.7
secondary (IOR)	350,000	41.0	301,800	35.3
tertiary (EOR)	48,000	5.6	54,400	6.4
	854,000		840,000	

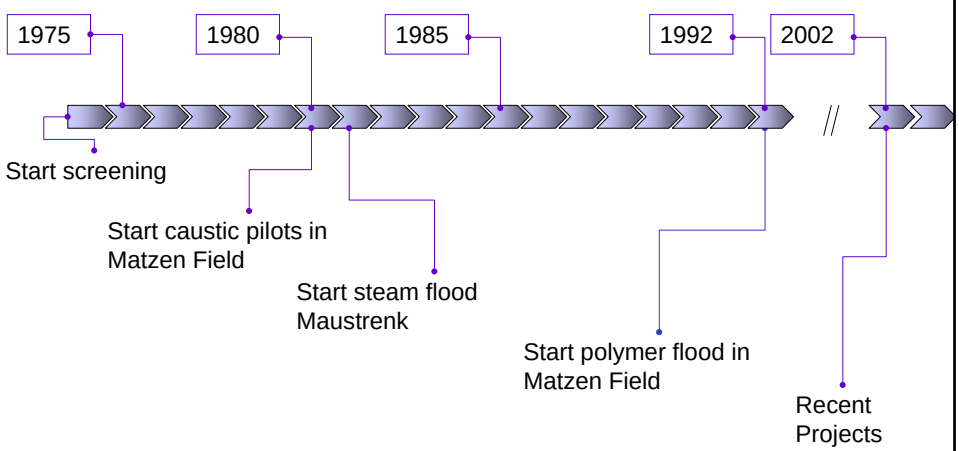
Introduction - Geology



Introduction - Geology



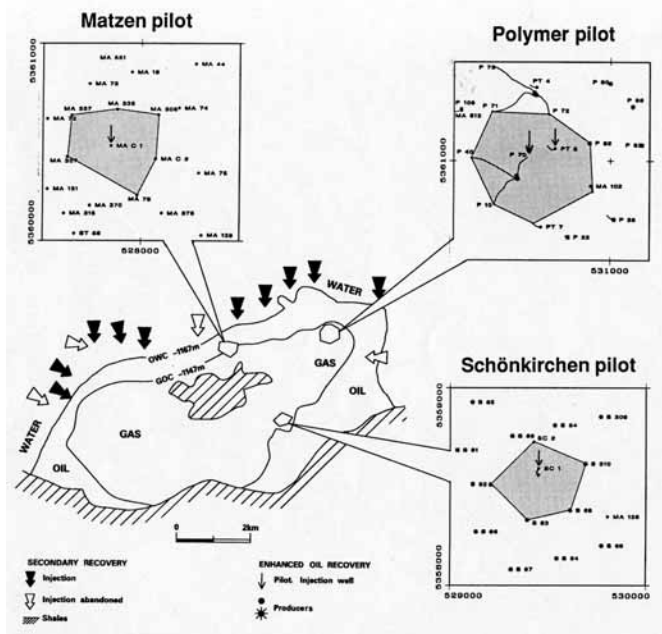
IOR/EOR History of OMV



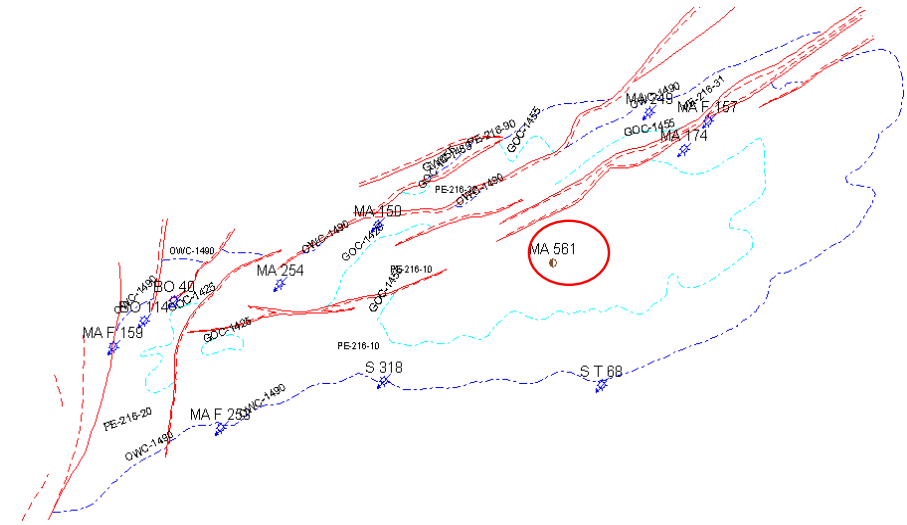
Projects

		WF	steam	caustic	polymer	C1+	N2	CO2
effect			μ_o reduction	IFT reduction	μ_w increase	gravity drainage	gravity drainage	gravity drainage μ_o reduction swelling of oil
field			Maustrenk	Matzen	Matzen	Matzen	St. Ulrich/Hausk.	Hochleiten
horizon			Schlierbasis	10THB	9TH	16TH		12SH, sector B
IOIP	10^6t		1.39	1.42	19	53.4	22.3	1.256
IGIP	10^6t		-	-	2342.3	6770	45.4	-
year			1981	1980	1992	1996	1993	2002
rel. oil density			0.898	0.924	0.928	0.905	0.86	0.936
depth	mSS		~630	~1330	1155	1470	~893	~800
permeability	mD		150	500-3000	300	960/708	0.25-1.54	149-2766
porosity	%		24	26-31	24.9	26	0-14.2	25
thickness	m		20.9	3.9	4.3	15.3	136.1	2-4.22
injection rate	m³/d				160	0.533-0.76		5264
efficiency	m³/t	17.5					71Sm³/t	

EOR-Pilots in the Matzen area



Gas Injection, Matzen‘s 16th Badenian Reservoir



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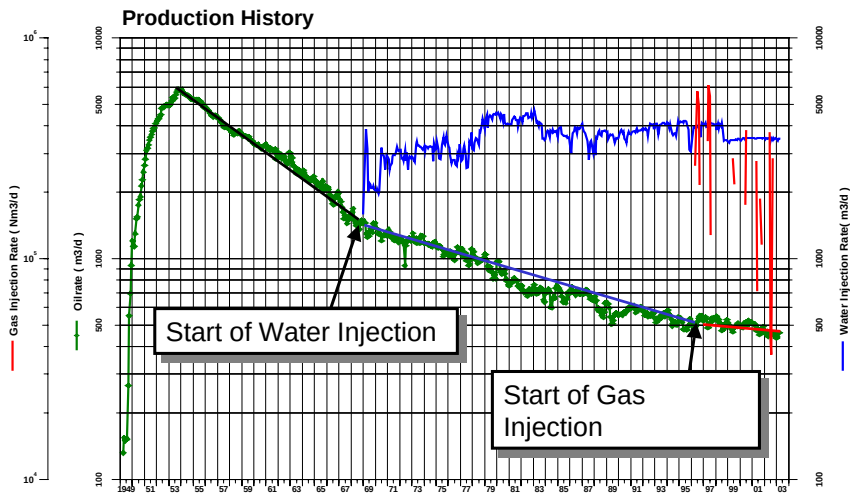
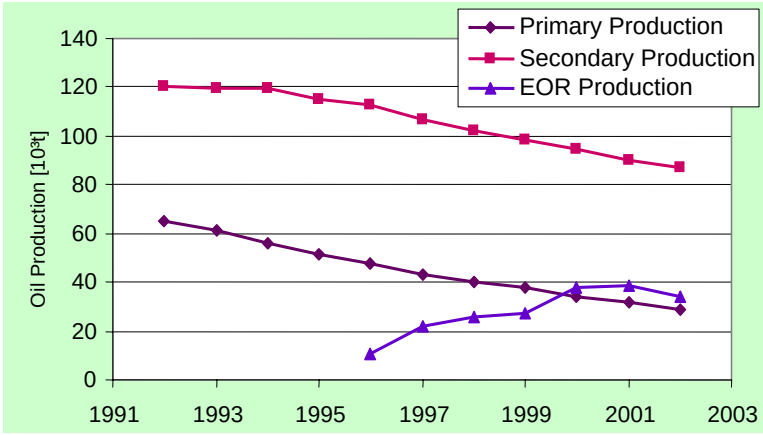


Gas Injection into Matzen´s 16th Badenian Reservoir



What limits the application of EOR today?

1. **Economics**
   - ? Oil prices
   - ? High cost of CO_2
   - ? Large initial investment
   - ? Large projects present an entry barrier

2. **Lack of Strategic Planning**

3. **Mentality or Culture**
   - ? A mindset that does not include EOR
   - ? Top management attitude and support
   - ? Lack of government support and strategic view
   - ? Concern about the return of low oil prices
   - ? Acceptance of EOR as a best practice

4. **Competitive Alternatives**
   - ? Continued exploration
   - ? Success of IOR

5. **Uncertainty / Risk**
   - ? Oil price volatility
   - ? Shortage of successful examples

6. **Focus on Cost Reduction**

What should be done ?

1. **Create Tax Incentives**

2. **Strategic Thinking**
   - ? Developed long term strategic views shared by government and industry
   - ? Developed innovative business schemes / models
   - ? Master plan for natural resources which includes EOR

3. **Developed Effective Partnerships**
   - ? Government ? industry, operators ? service companies
   - ? Joint technology development

4. **Provide Education and Training**
   - ? Industry
   - ? Academia

5. **Value Sequestered CO_2**

6. **More Successful Projects**
   - ? Document successful projects / Pilots
   - ? Improved surveillance

Thank you for your attention!