MICHAEL B. TWOMEY
ATTORNEY AT LAW
POST OFFICE BOX 5256
TALLAHASSEE, FLORIDA 32314-5256
Tel. (850) 421-9530 Fax. (850) 421-8543
e-mail: miketwomey@talstar.com

July 9, 2004

Blanca Bayo
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

Re: Docket No. 031033-EI - Review of Tampa Electric Company's waterborne transportation contract with TECO Transport and associated benchmark

Dear Ms. Bayo:

Enclosed are the Residential Customers submissions to Hearing Exhibit No. 97 to which TECO has already supplied the transcript of the deposition of Dr. Anatoly Hochstein.

Sincerely,

Michael B. Twomey
Attorney for the
Residential Electric Customers

cc: Parties

Teco letter to Blaca Bayo with late exhibit July 9, 2004.wpd

Dr. Anatoly Hochstein – Brief Bio

I received Masters Degree with honors in hydraulic engineering in 1955 from St. Petersburg University and PhD in economics in 1963, from Moscow University, both in Russia. Since my graduation I have devoted my professional life to water transportation industry and has participated in development of practically all major waterway and port systems around the world.

Since coming to the U.S. in 1973 I joined consulting company CACI, which at that time was engaged by the U.S. Army Corps of Engineers to develop Inland Navigation System Analysis (INSA) program. For this program I designed so called Flotilla model to calculate costs of barge operations. This model, although significantly modified by now, still is being utilized by USCOE as a principle analytical tool for inland waterway planning. In 1977 I joined Louis Berger Group, one of the largest international consulting companies with headquarter in East Orange, N.J. and three years later became Vice President in charge of water transportation programs. Among many projects I directed in that period can be mentioned a large-scale program "U.S. National Waterway Study", prepared for the U.S. Congress, participation as expert witness in litigation regarding construction of the Tennessee-Tombigbee Waterway, Structural and Non-Structural methods to increase navigation capacity and a long list of ports and waterways projects in South America and Asia.

In 1982 I was recruited to become Director and Distinguished Chair Professor of the newly established Ports and Waterways Institute at Louisiana State University. Concurrently I retain my position as a Vice President with Louis Berger Group. During my tenure as a first and current director of the Institute it has developed in the largest University based research center of maritime and intermodal research. In recognition of the Institute role it was designated by the Federal Maritime Administration as the National Institute. Among the programs completed under my direction just within last year are: - Market assessment for expansion of the Panama Canal; - Master Plan for Yangshan (Shanghai) port, the World's largest port construction project ($15 billion); - Louisiana Statewide Intermodal Plan and; - Evaluation of Shipping costs and Pricing in the Gulf of Mexico. The latter two research programs specifically included assessment of markets for coal and other bulk commodities, existing terminal capacities and detailed information on shipping costs in the Gulf of Mexico. Shipping costs were analyzed based on actual records for a variety of origin/destinations and vessel types in the Gulf and to/from the Lower Mississippi and ports of Houston and Tampa.

I authored or contributed to 5 books and published more than 60 articles in professional and scientific journals dealing with a broad range of water transportation issues. My latest book titled "Domestic Water Transportation-Comparative Review" is currently in print.

MAJOR BOOKS, JOURNAL PAPERS AND PRESENTATIONS:
By Dr. Anatoly Hochstein

"Inland Water Transport: Worldwide Review of Trends," Chapter in the book U.S. Public Waterways Investments: Pillars of the Economy, Trade and Growth, National Waterways Inc., 1997.

"Port Reform and Privatization in Environments of Limited Competition: The Experience in Colombia, Costa Rica and Nicaragua," Forthcoming in Maritime Policy and Management, England, 1997.

"Port Privatization: High Hopes for High Returns," Public Works Financing, January 1997 (et. al.).

"Port Development Trends in Latin America," Transportation Quarterly, Vol. 51, 1997 (with Paul Kent).

"Indonesia's Port Sector - A Case Study of Shipping Services," IPPM, New Orleans, LA, 1997.

"Costa Rica's Port Sector - A Case Study of Port Sector Reform," IPPM, New Orleans, LA.

"Intermodal Transport," Panel Chair, Conference Regional Market Integration in the Transatlantic Area, Washington D.C., September 10-12, 1997.

"International Port Development," Conference on Investments." The Center for Business Intelligence, Washington D.C., June 9-10, 1997.

"Privatizing Transportation Systems" (Chapter on Ports), Prager Press, 1996.

"Refrigerated Cargo in the Baltics," Proceeding of Conference on Inland and Maritime Navigation of East European Countries, Gdansk, Poland, 1996.

"Training of Maritime Professionals," Organization of American States, Asuncion, Paraguay, September 1996.

Freight Components in Louisiana's Statewide Intermodal Transportation Plan," Transportation Research Board, Proceedings, 1996 (et. al.)

"Development Strategies for the Maritime Sector in Asia", Permanent International Associations of Navigation Congresses (PIANC), Surabaya, Indonesia, March 1994.

"Maritime Research: The Missing Agenda," Business Economic Quarterly, Spring 1992.

"Inland Waterways Systems in Asia," 27th International Navigation Congress, Osaka, 1990.

"Intermodal Terminals on Inland Waterways" (with Dr. J. Binkley), Transportation Research Board, Annual Conference, January 1989, Washington, D.C.

"Numerical Model for Environmental Impact of Vessels in Restricted Channels," Journal of Waterways, Port, Coastal and Ocean Engineering, Vol. 115, July 1989 (with Dr. Charles Adams).

"Strategic Planning of National Port Systems," Papers of International Maritime Seminar, Korean Maritime Institute, 1988, Seoul, Korea.

"Port Strategic Planning, General Environment," AAPA Seminar on Port Strategic Planning, March 1988, Miami, FL.

"Potential for General Cargo in Off-Shore Barges and River/Ocean Vessels," Transportation Research Board, Annual Conference, January 1988, Washington, D.C.

"Inland Waterways of the World," U.S. Section of PIANC, (Permanent International Association of Navigation Congresses) Nashville, TN, 1988.

"A Port Training Delivery System for the Caribbean Region," Transportation Quarterly, April 1988 (with Paul Kent).

"Container on Barge," Transportation Research Board, Annual Conference, January 1987, Washington, D.C. (with Asaf Ashar).

"Improvement of Navigation in the Parana River," Workshop, University of Rosario, Argentina, November 1987.

"Inland Waterways in China," The World Bank mission report, 1986.

"Statewide Port Assessment," The Fourth Symposium on Coastal and Ocean Management, July 1985, Baltimore, MD.

"Non-Structural Improvements to Increase Economic Efficiency of Inland Waterways," National Waterways Conference, September 1985, St. Louis, MO.

"Non-Maritime Uses of Ports," Third National Sea-Grant Conference, May 1985, Baton Rouge, LA.

"Topping-Off Facilities to Accommodate Large Bulk Carriers," Transportation Research Forum, November 1985, Jacksonville, FL.

"Methodology of Cost Allocation Among Users of Multipurpose Water Resources Projects," Transportation Research Board, Annual Conference, January 1986, Washington, D.C.

"Optimization of Channel Maintenance Expenses," ASCE Journal of the Waterway, Port, Coastal and Ocean Engineering, Vol. 109, 1983.

"INSA Users Course," Cincinnati, OH, Army Corps of Engineers, 1976.

"INSA Coordination Conference," San Francisco, CA, Army Corps of Engineers, 1975.

Future Development of Inland Waterways, Transport, Moscow, 1973, 180 pages.

Navigable Use of Artificial Reservoirs, Transport, Moscow, 1972, 223 pages.

Evaluation of the Economic Efficiency of the Multi-purpose Project, Energy, Moscow, 1972, 120 pages.

"Inland Waterways Development and their Significance in the National Economy," River Transport, N12, 1972.

"Evaluation of the Economic Efficiency of Inland Waterways as a Component of a Multi-Purpose Scheme," Hydro technical Construction, N8, 1970.

"Indexes of the Waterways Development and Management," Papers of the Navigation Institute, Moscow, N78, 1970.

"Optimization of the Water Releases from Reservoirs for Navigation Purposes," Papers of the Navigation Institute, Moscow, N68, 1969.

"Alternatives of the Reservoir Water Resources Use and Their Impact on Navigation," Papers of the Hydro Technical Institute, 1969.

"Optimization of the Reservoir Water Resources," Conference papers, Moscow, 1969.

"The Navigation Canals Design and Experience of the Operations," The Conference Papers, Kiev, 1968.

"Forming of the Inland Waterways Network and Irrigation Buildup," River Transport, N2, 1967.

A Single Deepwater System of Inland Waterways in the European U.S.S.R., Transport, Moscow, 1967, 60 pages. (Russian and English)

Basis of Navigable Use of the Big Water Industry Canals, Transport, Moscow, 1967, 60 pages. (Russian and English)

"Evaluation of the Permissible Vessel Speeds in the Navigable Canals," River Transport, N8, 1965.

"The Stability, Dimensions and Shape of the Irrigation Canals," Academy of Science, U.S.S.R., 1965.

"The Ship Waves and Speed Limitations in the Canals," Papers of the Navigation Institute, 1965.

"Controlling Canal Dimensions and Effective Ratio of Ships vs. Canal Cross-Sections," River Transport, NI, 1965.

"Some Problems of Navigation Use of the Multi-Purpose Canals," Papers of the Navigation Institute, 1963.

"Wind-Wave Regime in Reservoirs and Formation of Shores," Papers of the Navigation Institute, 1962.

Multi-Purpose Use of Karakum Canal," Turkmen Science Academy, Ashchabad, 1961.

Louisiana Statewide Intermodal Transportation Plan

THE MARITIME SECTOR

Submitted by:

National Ports and Waterways Institute
University of New Orleans

June, 2001

LOUISIANA STATEWIDE INTERMODAL TRANSPORTATION PLAN

THE MARITIME SECTOR

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

The network of ports and navigable waterways in Louisiana is an important component of the intermodal freight transportation infrastructure. In terms of physical infrastructure it includes the navigable waterways-shallow and deep-draft, ports and intermodal connections serving waterfront activities, and the vessel fleet operating on the network. On a functional basis, it can essentially be defined as two subsystems: an inland barge transportation system engaged primarily in domestic commerce; and a deep-draft ports system providing access to international markets through the Gulf of Mexico.

The combination of inland barge transportation with ocean shipping has a pervasive effect on the system with regard to the type of cargos handled, terminal configurations, and the market structure of the maritime industry. The inland waterways system enabling efficient movement of low-value cargos for long distances through the interior has favored bulk material handling. Responding to scale economies typical to all phases of bulk cargo handling, namely, barge transportation, materials transfer at terminals and bulk ocean carriers, the maritime industry has developed as vertically integrated mega-terminals operated by large multi-national firms. The terminals handling grain and coal for export, cement, steel and crude petroleum imports, chemicals, etc. fall into this category and are responsible for a greater part of the tonnage handled.

However, the industry consists of other stakeholders at the waterfront, such as shallow and deep-draft public ports, small-scale service industries. shipbuilding and barge repair, offshore oil and gas supply services, etc. Therefore, the public policy framework for the state's maritime sector must recognize the physical and institutional characteristics of each subsystem within the industry.

1996 Statewide Intermodal Plan

The purpose of this section is to make an assessment of the current situation in the maritime industry as an update to the Louisiana Statewide Intermodal Transportation Plan (SITP) completed in 1996. As a complete assessment of physical capacities was undertaken and the results are included in that report, only important changes since then are discussed in this report[1]. The emphasis in this review will be more on institutional aspects of the industry that will help in public policy formulation. As the construction and maintenance of navigable waterways is a federal responsibility, the role of the state is mainly in facilitating federal agencies in their efforts. The ownership and operation of private terminals, barge transportation, and ocean shipping, etc., are largely by the private sector where infrastructure investment decisions are made under open market conditions. Therefore, the public sector role is mainly to create a favorable environment to attract private capital to the industry, and make selective public sector investments.

[1] For a detailed analysis in this area see The Working Paper on Water, Rail, and Intermodal Freight Transportation. Louisiana Statewide Intermodal Plan, LSU National Ports and Waterways Institute, July 1995.

For analytical convenience the discussion will concentrate on structural components of the industry in terms of the navigable waterway network, the port system and intermodal connections, the vessel fleet, etc. However, as economic development and industry productivity are inextricably linked with the institutional framework as well, the review will focus on several aspects such as industry structure and management, barriers to entry, throughput capacities and the market environment and emerging policy issues, etc.

II. THE NAVIGABLE WATERWAYS NETWORK

The physical infrastructure of the water transportation subsystem could be defined in terms of three main components, each component having a distinct set of issues relating to infrastructure planning.

- **The network of navigable waterways.** Federal funding for construction and maintenance of navigable waterways; the State share of such fundings, multi-dimensional uses of waterways for transport, flood control, water supply and water-based recreational activities

- **Ports and intermodal land connections**. Competing and complementary interests of public ports and private terminals, issues related to inland ports and ports handling foreign commerce, market competition from out-of-state ports, and strategic planning issues to meet the market competition.

- **The vessels fleet.** Completely operated by the private sector, incentives to the barge and ship building industry, capacity issues to meet seasonal demand, safety regulations for safety of humans and the environment, etc.

II.1 Navigable Waterways

Louisiana is located at the intersection of the two largest waterway networks, the Mississippi River System and the Gulf Intra-coastal Waterway, comprising 86 percent of the national network in terms of length and 97 percent of the system's overall tonnage. Therefore, the water transportation system provides accessibility to a large hinterland including states in the Mid-West and the Gulf Coast. These highly developed transportation systems with heavy traffic are efficient modes of transportation with increasing economies of scale, especially for low-value high volume bulk cargoes. As a result, a large number of multinational businesses engaged in foreign commerce, petrochemical industries, shipbuilding and many other value-added industrial activities are located at the waterfront.

The basic physical features and the traffic densities of the navigable waterway segments are shown in Table 1. As the data is reported from the U.S. Army Corps of Engineers database, the information on some segments extends beyond state boundaries. The major economic activities in foreign commerce are concentrated on the 236 river-mile long section on the Lower Mississippi below Baton Rouge. The ship cannel in this section is maintained at 45 feet. In addition, the Calcasieu Ship Channel (40 feet deep) serves as the access channel to the Port of Lake Charles and several other private terminals.

The data provided in Table 2 offers more information on the type of vessels and the type of major activities. Although the number of trips without vessel characteristics yields very limited information, it can be used to compare traffic densities on similar waterway segments. However, due to the principle difference between deep draft and shallow draft segments they should be viewed separately.

As the Lower Mississippi dredging up to Baton Rouge was completed in 1995 from 40 feet to 45 feet, we analyzed the vessel trips data for 1999 to make an assessment of the effect of this improvement. The data indicate that vessels with more than 40 ft draft used the river for 833 trips (Table 3). The major beneficiaries are the dry cargo terminals at the Port of South Louisiana accounting for more than 52 percent of the vessel trips. A similar analysis for trips made by vessels with more than 35ft. draft is also included for the Calcasieu Ship Channel and the Mississippi River Gulf Outlet (MRGO). The results indicate that in 1999 the Calcasieu Ship Channel had 434 such trips and 79 percent of these vessel trips were by tankers supplying crude petroleum to the refineries in the area.

Table 1
The Navigable Waterways Network in Louisiana by Major Segments

Waterway Segment	Length-miles	Depth-feet	Vessel trips in 1999
Atchafalaya River	121	14	15,442
Calcasieu River and Pass	110	12-40	50,640
GIWW- Mobile Bay, AL to New Orleans	134	12	48,655
GIWW- Mississippi R. to Sabine River	266	10-12	126,038
GIWW- Morgan City Port Allen Route	64	10	29,811
Baton Rouge to state border*	271	9	232,466
Miss. R. New Orleans to Mouth of Passes	106	45	209,254
Mississippi R. Baton Rouge to New Orleans	130	40-45	273,313
Mississippi R. Gulf Outlet	75	35	2,368
Red River Shreveport to Mississippi R**	236	9	5,787

Note:
* Trips shown for this waterway segment are from the Mouth of Ohio River to Baton Rouge.
**Trips shown for the Red River segment are traffic below Fulton, AR.
Source: Waterborne Commerce of the United States, U.S Army Corps of Engineers, 1999.

As no major capacity expansion projects are planned by the U.S. Army Corps of Engineers the waterway network and capacities are expected to remain at the present levels for the foreseeable future. The replacement of the Inner Harbor Navigation Canal (IHNC) lock with a larger (1200 feet by 110 feet) one is expected to improve operational efficiency of the system, eliminating congestion at the lock which averages delays of 11.5 hours per tow. IHNC which links barge traffic between the Mississippi River and the Gulf Intracoastal Waterway is also serving as a passage for deep-draft vessels between the Mississippi River and the Mississippi River Gulf Outlet (MRGO). The total cost of

the project is estimated to be $531 million and the construction period is expected to be about 14 years. The funding for the shallow-draft component of the project ($463 million) is from federal funds and the deep-draft component ($68 million) is to be funded by the Port of New Orleans.

Table 2
Travel Densities by Trips on Deep-Draft Navigable Channels in Louisiana-1999

Port Area*	Self-propelled vessels			Non self-propelled		Total
	Passenger /dry cargo	Tanker	Tow/tug	Dry cargo	Tanker	
Domestic:						
Baton Rouge	1,258	239	24,660	23,366	19,991	69,514
S. Louisiana	4,266	400	25,732	86,673	24,844	141,915
New Orleans	31,995	236	24,804	30,262	12,826	100,123
Plaquemine	24,032	726	4,864	22,528	3,539	55,689
MRGO	300	1	282	521	117	1,221
Lake Charles	28,697	313	5,797	3,782	10,102	48,691
Total	90,548	1,915	86,139	167,132	71,419	417,153
Foreign:						
Baton Rouge	564	597	1	0	1	1,163
S. Louisiana	2,462	1,110	23	19	4	3,618
New Orleans	5,260	766	76	68	8	6,178
Plaquemine	833	219	19	18	0	1,089
MRGO	1,093	26	14	12	2	1,147
Lake Charles	894	895	93	67	0	1,949
Total	11,106	3,613	226	184	15	15,144
Grand Total	101,654	5,528	86,365	167,316	71,434	432,297

Note:
The Mississippi River segments for port areas are measured by river miles beginning AtHead of Passes (AHP): Baton Rouge 253-168.5 AHP; South Louisiana 168.5-114.9 AHP; New Orleans 114.9-81.2 AHP; and Plaquemine 81.2-0 AHP.
Source: Waterborne Commerce of the United States, U.S Army Corps of Engineers, 1999.

II.2 Mississippi River Gulf Outlet

The Mississippi River Gulf Outlet (MRGO) provides a 36 ft. deep access channel to ocean liners from the Gulf of Mexico to the Port of New Orleans Inner Harbor Facilities. The outlet is about 37 miles and about 4 hours in travel time shorter than the traditional Mississippi River route. With that channel in place, the Port of New Orleans built the France Road and Jourdan Road Terminals. They have come to be known as the Tidewater Terminals and are the primary location of container activities at the Port of New Orleans.

In recent years, the MRGO has experienced grave problems related to coastal erosion and siltation raising environmental concerns. These problems have led to excessive

maintenance costs for the Army Corps of Engineers. Due to the excessive cost and environmental pressures, it is anticipated that the dredging funded by the Federal Government will cease in five to ten years. Due to these circumstances, the Port of New Orleans has undertaken a major rehabilitation program of the Mississippi River terminals. This includes major renovations at the Nashville Avenue Terminal. Once complete, the port container capacity will be doubled. Container vessels will continue to call at the Tidewater Terminals (as long as adequate draft is available) but the ports entire container operation will not be dependant on that single location.

Table 3
Vessel Trips Made in Deep-Draft Waterway Segments in 1999

Port	Passenger/dry cargo	Tankers	Total
Vessel Trips >40 ft draft:			
Baton Rouge	60	6	66
South Louisiana	431	13	444
New Orleans	86	58	144
Plaquemine	141	38	179
Vessel Trips >35 ft draft:			
Lake Charles	92	342	434
MRGO	86	5	91
Total	896	462	1,820

Source: Waterborne Commerce of the United States, U.S Army Corps of Engineers, 1999

II.3 The Red River Waterway

The major addition to the waterway network since 1990 was the opening of the J. Bennett Johnston Waterway (Red River) in 1994. It extends north to Shreveport adding another 236 miles of navigable waterways to the state's network. The total cost of the project is estimated to have been $1.989 billion, with a federal funding share of $1.889 billion. The Red River Waterway infrastructure includes five locks and dams, with a total lift of 141 feet. With its 200-foot wide channel and the depth of 9 feet, the waterway is designed to carry a six-barge-tow (Table 4).

Table 4
The Red River Waterway – Lock and Dam Characteristics

Lock and Dam	Location - River mile	Year of completion	Chamber width- feet	Chamber length-feet	Lift-feet
Lindy C. Boggs	28.7	1984	84	685	36
John H. Overton	88.0	1987	84	685	36
L&D 3	140.0	1991	84	685	36
Russell B. Long	208.0	1994	84	685	25
Joe E. Waggonner, Jr.	250.0	1994	84	685	25

Source: The 1997 Inland Waterway Review, U.S. Army Corps of Engineers, September 1997, Revised August 1999.

In addition, the U.S. Army Corps of Engineers is conducting a systems analysis on the seven locks on GIWW between the Mississippi and Sabine Rivers. The results of the reconnaissance phase of the systems analysis have indicated that all locks are structurally sound and the delays currently experienced are due to restrictive lock dimensions. Two of the locks, Bayou Sorrel and Calcasieu locks have been identified as priority projects for capacity expansion. However, the projects are in feasibility study stages and so far no investment decisions have been made.

Emerging Issues. The emerging issues on inland waterways are mainly national in scope, because the capacity of the network depends on the weakest link. Some of the issues that are of particular relevance to Louisiana are briefly discussed below.

- *Congestion* - Traffic congestion on the Upper Mississippi River and the consequent cost increases are of direct relevance to the Louisiana maritime sector. Low capacity for navigation in the Upper Mississippi may result in stagnation or even reduction of the element for Louisiana Maritime related infrastructure, first of all in grain export. Therefore, the proposed replacement of 600-foot long locks with longer (1,200-foot) is of direct relevance to Louisiana.

- *Funding*- The current fuel taxed system is limited to a fixed 20 cents per gallon levy, which becomes progressively smaller with inflation. With an aging infrastructure and escalating costs, the operation and maintenance budgets will be under constant pressure to cut down services. As a result a series of changes are likely to emerge.

- *Local Participation*- Higher amounts of cost sharing by local and state agencies

- *Abandon low-volume waterways*- This policy, which is referred to as "Navigation mission policy changes" by the Corp, is to adjust service levels at lower used segments of the network.

- *Revenue generating measures* - This suggests increased fuel taxes and user fees.

III. THE DEEP-DRAFT PORTS

The port system in Louisiana consisting of a large number of private terminals and twenty-six public ports can be classified in several ways. For the purposes of our analysis, the port sector will be discussed under three main categories: (1) Deep-draft ports, both public and private, engaged in foreign commerce; (2) Shallow-draft public and private ports mainly engaged in industrial processing activities and, (3) Coastal ports functioning as supply bases to the offshore oil and gas industry in the Gulf of Mexico.

The major differences can be discussed in terms of ownership as public and private ports, or in terms of shallow-draft and deep-draft ports, or as cargo-handling ports in contrast to ports functioning as industrial parks. In a typical port facility these differences are not very clear, for example, the private sector operating public facilities, dual operations of

industrial processing and cargo handling, etc. A detailed analysis of these characteristics is beyond this study. However, for statewide infrastructure planning and in public policy formulation, it is vitally important to recognize these divergent (and complementary) economic, regional and political interests.

All maritime terminals on the Lower Mississippi River segment (including MRGO) and the Calcasieu Ship Channel fall into this category. In general, the navigable waterway segments with more than 25 feet in depth are regarded as deep-draft port terminals. The six deep draft public ports located on the waterway segment from Baton Rouge to Mouth of Passes are among the largest in the nation in terms of tonnage handled (Table 5). A large number of private terminals operating in each public port area are primarily responsible for this performance.

The tonnage shown in Table 5 includes cargo handled at public as well as private terminals. The private sector contribution to the total tonnage comes from (1) the privately owned and operated port terminals typically dedicated to handle one type of cargo such as grains and coal export terminals and crude petroleum import terminals. These terminals are mostly under the management of multi-national firms with vertically integrated operations (e. g., grain buying at farm level, cleaning, blending for export and loading for shipping). The cargo handling activities are highly automated using state of the art equipment, with scale economies. Consequent to the recent increases in steel imports, several mid-stream terminals exhibiting similar characteristics have developed, transferring cargo direct from ship to barges in large volumes. (2) The private sector operators also lease public port facilities, and manage bulk cargo terminals, general cargo and container berths at public ports. The role of public ports is mainly to function as 'landlord' ports supplying port facilities to the private sector and engaging in port marketing and promotion activities.

Table 5
Deep-Draft Ports in Louisiana, Tonnages Handled, and National Rankings in 1999 (in 1000 tons)

Port	Total	Imports	Exports	Rank
South Louisiana	214,197	29.407	65,336	1
New Orleans	87,511	29.187	19,722	4
Baton Rouge	63,729	13.331	7,074	7
Plaquemines	62,461	12.839	9,011	8
Lake Charles	50,742	27.001	3,751	13

Note: Port of St. Bernard data is included with New Orleans *Source:* Waterborne Commerce of the United States, Part 5-National Summaries, U.S. Army Corps of Engineers, 1999

The private sector plays a significant role in operating public port facilities as well as supporting a large number of dedicated private terminals. In terms of waterfront infrastructure investments, the private sector is the largest, second only to the federal government outlays. One cornerstone of public policy must be to maintain favorable conditions for the private sector participation and encourage larger capital inflows to the industry from the private sector.

IV. CARGO FLOW ANALYSIS

An analysis of freight handled by the ports and waterways system is important for infrastructure planning studies to determine existing capacity utilization levels and constraints as well as future infrastructure needs based upon changing market conditions. An overview of the cargo volumes handled by the Lower Mississippi ports network in the 1990's indicates several important characteristics and trends (Tables 6 and 7).

- *Dependence on foreign trade* - The foreign trade share in total cargo handled remained steady at about 80 percent of the total traffic during the periods 1992-94 and 1997-99. Therefore, the variations in tonnage handled are closely related to international trade conditions. For example, the total traffic increased by 2.6 percent or by 6 million tons (214 to 220 million tons) during the period and the corresponding increase in foreign trade was 2.0 percent or by 4 million tons (181-185 million tons) (Tables6-7).

- *Few Major Commodities* - Six major commodity groups account for more than 90 percent of the cargo handled, and farm products remain at the top accounting for more than 30 percent of the total (Table 8). The petrochemical industry with links to commodity groups of crude petroleum, petroleum products, industrial and agricultural chemicals constituted 37 percent of all traffic handled during the 1997-99 period.

- *Cargo Trends* - Based upon the changes between 1992/94 and 1997/99 periods, all traffic grew by 2.6 percent and foreign trade by 2.0 percent, which is less than one percent annual growth in total tonnage for the Lower Mississippi segment. On the Calcasieu segment all traffic grew by 11. 4 percent and foreign trade by 15.1 percent, registering an annual growth of 2 percent and 3 percent for foreign trade respectively (Table 9). The trends for major commodity groups will be examined further under the cargo terminal analysis.

- *Structural Trends* - The variations in trends among individual commodity groups have resulted in significant structural changes in the total traffic and the total volumes of foreign trade (Table 8). For example, coal exports that contributed 6.5 percent to total foreign trade in 1992/94 decreased to 3.8 percent in 1997-98. A significant change from an economic viewpoint is the emergence of metals and primary manufactures as the third largest category, indicating an increase in container cargo, general cargo and neo-bulk cargo, mainly steel.

Table 6
Freight Traffic on the Lower Mississippi River – Baton Rouge to Mouth of Passes, Including MRGO (in tons 1000)

Commodity	1992-94 3-year average	1997-1999 3-year average	Change in tons	Change (%)
Coal	26,368	18,673	-7,695	-29.2
Crude petroleum	9,964	9,565	-399	-4.0
Petroleum products	42,018	40,562	-1,456	-3.5
Agricultural Chemicals	8,342	7.525	-817	-9.8
Industrial chemicals	21,987	24,028	2,041	9.3
Forest Products	246	857	611	248.4
Non metallic minerals	20,706	25,923	5,217	25.2
Metals and manufactures	9,571	17,602	8,031	83.9
Farm products	74,526	73,446	-1,080	-1.4
Other	541	1,703	1,162	214.7
Total	214,416	220,000	5,584	2.6

Source: Waterborne Commerce of the United States, Various issues, U.S. Army Corps of Engineers.

Table 7
Foreign Commerce Traffic on the Lower Mississippi River – Baton Rouge to Mouth of Passes, Including MRGO (in tons 1000)*

Commodity	1992-94 3-year average	1997-1999 3-year average	Change in tons	Change (%)
Coal	11,838	7,019	-4,819	-40.7
Crude petroleum	44,422	40,155	-4266	-9.6
Petroleum products	16,862	14,576	-2285	-13.6
Agricultural Chemicals	3,689	3,767	78	2.1
Industrial chemicals	3,261	4,088	827	25.4
Forest Products	652	1,160	508	78.0
Non metallic minerals	12,056	13,933	1877	15.6
Metals and manufactures	8,938	18,048	9110	101.9
Farm products	79,544	82,070	2526	3.2
Other	354	385	8	2.1
Total	181,667	185,240	3574	2.0

Source: Waterborne Commerce of the United States, Various issues, U.S. Army Corps of Engineers.

Table 8
Structural Changes in Waterborne Commodity Tonnage – 1992/94 and 1997/98 periods, Lower Mississippi including MRGO

Major Commodity Group	1992-94 average		1997-99 average		Trend
	Rank	Share of Total	Rank	Share of Total	1992/94 to 1997-99
All Traffic					
Farm products	1	34.7	1	33.4	(-)
Petroleum products	2	19.6	2	18.4	(-)
Coal	3	12.3	5	8.5	(-)
Industrial chemicals	4	10.3	4	10.9	(+)
Non metallic minerals	5	9.7	3	11.7	(+)
Manufactures and metals	6	4.5	6	8.0	(+)
Total	N.A.	91.1	N.A.	90.9	N.A.
Foreign Commerce					
Farm products	1	43.8	1	46.7	(+)
Crude petroleum	2	24.5	2	21.7	(-)
Petroleum products	3	9.3	4	7.9	(-)
Non metallic minerals	4	6.6	5	7.5	(+)
Coal	5	6.5	6	3.8	(-)
Manufactures and metals	6	4.9	3	9.7	(+)
Total	N.A	95.6	N.A	97.3	N.A.

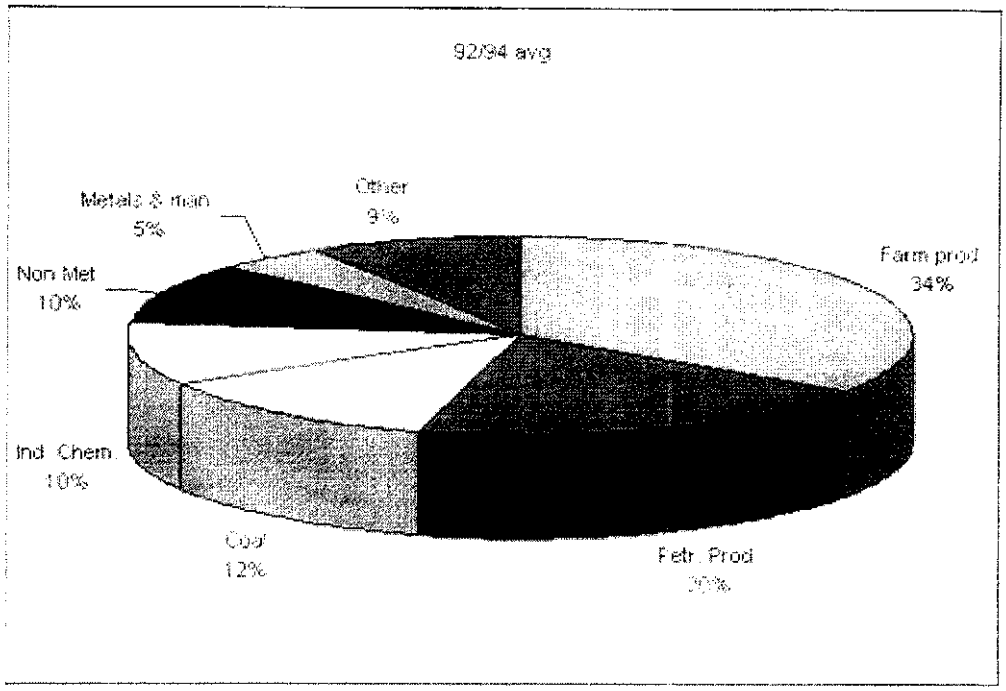
Source: Tables 6 and 7.

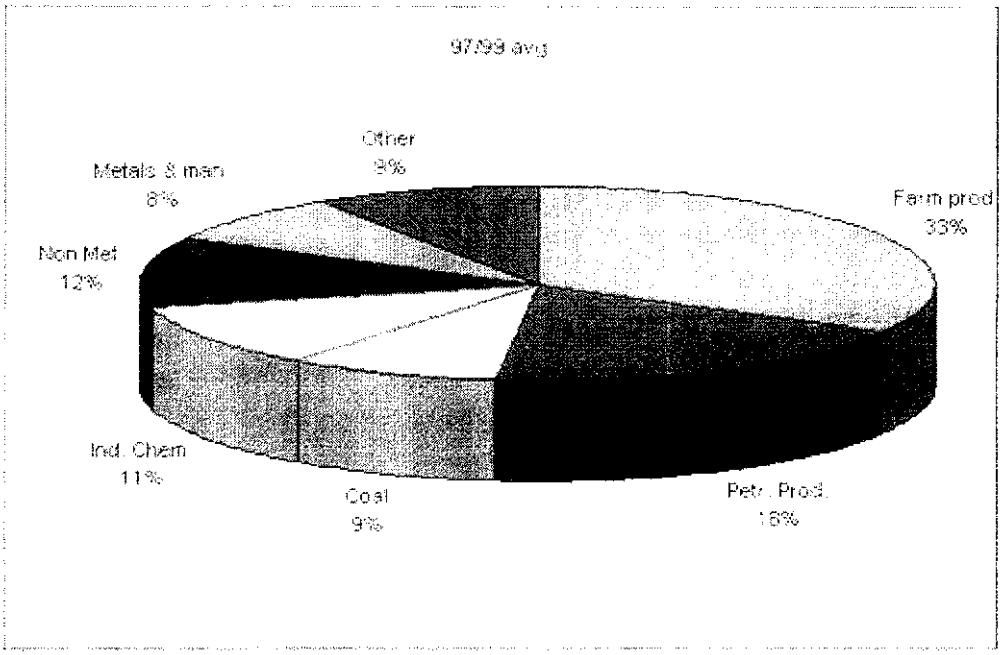
Table 9
Foreign Commerce and All-Traffic on the Calcasieu Ship Channel (in thousand tons)

	All Traffic			Foreign Commerce		
Commodity	92/94	97/99	Change%	92/94	97/99	Change%
Coal	119	119	-0.07	1.7	6.5	290.00
Crude petroleum	22,404	26,596	18.71	18,265	23,367	27.93
Petroleum products	15,664	15,365	-1.91	5,000	4,485	-10.30
Agricultural Chemicals	3,097	3,351	8.20	599	544	-9.09
Industrial chemicals	1,543	2,013	30.45	598	866	44.78
Forest Products	597	130	-78.17	487	119	-75.51
Non metallic minerals	1,854	3,008	62.25	1,018	1,872	83.78
Metals & manufactures	397	544	37.08	161	263	62.71
Farm products	1,410	1,223	-13.28	916	747	-18.50
Other	392	1,852	372.32	73	205	181.42
Total	45,935	51,172	11.40	26,520	30,358	15.15

Source: Waterborne Commerce of the United States, Various issues, U.S. Army Corps of Engineers.

Figure 1
Waterborne traffic on the Lower Mississippi- commodity shares 92/94 and 97/99 periods





IV.1 Grain Export Elevators

During the 1990's farm products were responsible for more than one-third of the tonnage handled. Grains and grain products constituted more than 70 percent of this tonnage. For example, out of the 79 million tons handled in 1999, 77 million tons consisted of corn, wheat, soybeans, and processed grains for animal feed. The mutual interdependence of agriculture and inland waterways in the U.S. is due to several interesting factors. The interior location of farms far away from domestic markets and deep-draft ports for exports and the bulky nature of inputs and outputs fits in very well with what inland waterways can offer- economical long distance transportation for low-value bulky cargoes. On the other hand, as farm products provide the vitally important cargo base for inland waterways, the interdependence is mutual.

The grain exports from Louisiana are handled by land-based export elevators (Table 10), by floating rigs located mid-river (Table 11) and by direct transfer from barges to ocean vessels. The essential difference is that the land-based elevators have the added capability of performing two important value-added activities: grain blending and grain storage.

Table 10
Grain Export Elevators in Louisiana – Shipping Capacities

Name of Elevator	River mile	Storage Capacity (bushels)	Load Cap./hr (bushels0	Number Shipping bins	Capacity in each bin	Number Shipping Spouts	Number Shipping Belts
Myrtle Grove	61.0	6.5 m.	90,000	6	30,000	4	1
Cargill-Westwego	102.8	4.3m	100,000	12	30,000	6	4
ADM-Growmark-Ama	117.5	5.0m	80,000	8 8	20,000 40,000	4	2
Bunge Grain	120.1	6.2m	80,000	7	20,000	8	2
ADM-Growmark-Destrehan	121.0	6.27m	80,000	9	25,000	7	2
ADM-Growmark-Reserve	139.0	3.6m	80,000	4	5,000	3	2
Zen-Noh Grain	164.5	4.0m	120,000	12	30,000	4	2
Port of Baton Rouge	228.0	7.0m	60,000	none	n.a.	4	1
Lake Charles Public Elevator	N.A.	0.75m	25,000	3	12,000	2	2
Total	---	43.62m	715,000	68	1.72m*	42	18

*Total bin capacity
Source: Directory of Export Elevators, Foreign Grain Inspection Service, U.S. Department of Agriculture, August, 2000.

Table 11
Mid-River Direct Loading Facilities for Grain Exports in Louisiana–Shipping Capacities

Name of Facility	River mile	Storage Capacity (bushels)	Load Cap./hr (bushels)	Number Shipping Spouts	Number Shipping Belts
Gemini Floating Rig	121.1	None	27,500	1	none
Cargill-Terre Haute	140.0	7.743m	100,000	4	2
Peavey Elevator	150.0	2.0m	60,000	1	1
Delta Floating Rig	157.0	None	50,000	1	1
K-2 Barge Floating Rig	158.0	None	60,000	1	none
RG-1 Floating Rig	175.0	None	30,000	1	none
Rig-America	175.0	None	47,000	1	none
Total	---	9.743m	374,500	10	4

Source: Directory of Export Elevators, Foreign Grain Inspection Service, U.S. Department of Agriculture, August 2000.

Except for the public grain elevator at the Port of Lake Charles, all other grain export elevators are located on the Lower Mississippi River (Table 12). The concentration of thirteen of them on a 75-mile stretch of the River is partly related to the fleeting operations of barges. The land-based grain elevators are complete facilities with long-term storage and highly automated grain-conveying systems. They are typically owned and operated by large multinational corporations with vertically integrated marketing functions controlling activities from the farm level all the way to international transactions. In order to exploit progressively increasing scale economies the land-based export elevators are designed to handle large volumes. The floating rigs, where grain is loaded directly using floating cranes are more modest investments compared to land-based elevators. The flexible aspects of this operation are the ability to use the mooring and cranes to handle variety of cargo at low costs. However, the uninterrupted supply of barges for loading and minimizing barge demurrage are two major challenges.

Table 12
Summary of Export Grain Elevator Characteristics on the Lower Mississippi

Characteristics	Description
Number and type	Land-based 8 and floating rigs 7. Total 15
Location	Thirteen out of the fifteen are located between River miles 100-175.
Average storage capacity	5.36 million bushels for land-based elevators.
Average loading capacity per hour	Land–based elevators 86,000 bushels/hour; floating rigs 53,500 bushels/hour.
Avg. # of shipping bins and capacity	7.2 shipping bins with 191,000 bushels capacity (land-based elevators only).
Avg. # of shipping spouts	Land-based elevators 4.4; floating rigs 1.4
Avg. # of shipping belts	Land-based elevators 1.7; floating rigs 0.6

Sources: Tables 10 and 11

Emerging Trends. The U.S. role as an exporter of food is projected to continue into the foreseeable future. However, the long-term growth rates of grain exports are tied up with a combination of economic factors and government policy in the U.S. as well as in importing countries. In general, the major determinants are:

- *Economic* - As grains and oilseeds are food or feed products the demand will depend on population growth, income and consumer preferences.

- *Trade*- Volumes of foreign trade will be determined by domestic production and use patterns, trends in global trade and regional specialization.

- *Technology*- Even though agricultural biotechnology is in its infancy, separate handling systems for bio-engineered products and non-bio-engineered products may be necessary to maintain grain quality. Further, as genetically modified crops are not accepted in certain markets additional storage systems may be necessary.

The export projections made by the USDA for major export crops are shown in Table 13. A key assumption in deriving these estimates is that U.S. government agricultural policies will continue without substantial change during the period. According to the estimates export volumes are projected to grow in the next 20 years by 42 percent, mostly corn and soybean shipments.

As export volume is the excess production left over after domestic use, grain and oilseeds utilization patterns in the domestic markets are an important determinant. Because of the fast growing livestock industries (poultry, beef, pork, and dairy), increasing quantities of corn and soybean will be diverted to the domestic market. Therefore, the demand for grains as feed is projected to increase in the next 20 years by an average of 28 percent.

Table 13
U.S. Grains and Oilseeds Exports - 1999 (actual) and 2020 (projected)

Commodity	1999	2020	Change in Volume	Change in (%)
	Million	bushels		
Corn	1875	2810	935	49.9
Soybeans	965	1488	523	54.2
Wheat	1090	1293	203	18.6
Total	3930	5591	1661	42.3

Source: U.S. Department of Agriculture, *Agricultural Transportation Challenges of the 21st Century, Agricultural Marketing Service, November 2000.*

IV.2 Coal Terminals

Coal is a major commodity transported on the Lower Mississippi contributing on the average 10 to 12 percent of the total waterborne tonnage. The transportation of coal in Louisiana is primarily for three purposes: for local use at electric utilities and industrial plants; through traffic in transit from producing states to consumption states and coal shipments for export.

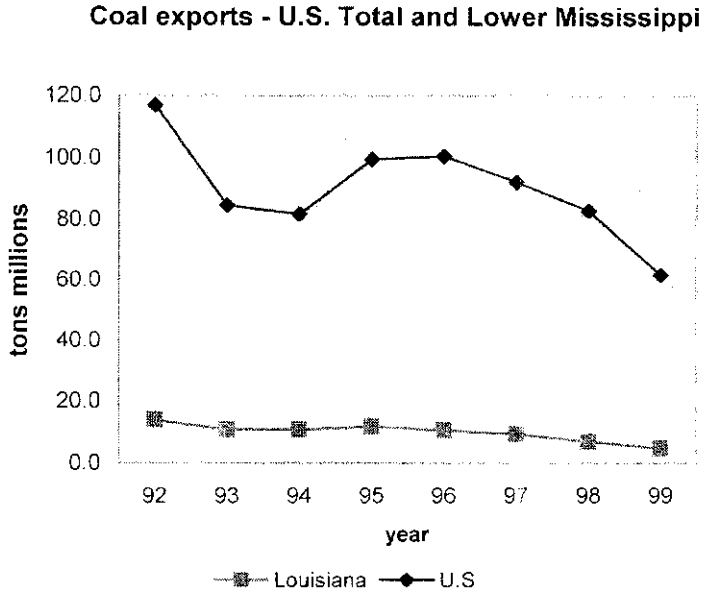
Coal for local use – Electric utilities and other industrial plants used 15.8 million tons of coal in 1998. Out of this tonnage 10.3 million tons were transported by rail from Wyoming to the Big Cajun Electric Utility and another 3.5 million tons were locally produced and consumed in the same area. Thus, only about 2 million tons were transported by water for local use in the state.

Coal in transit – The major movements under this category are the coal movements moving down the Mississippi and then to destination points in Florida using the Gulf Intra-coastal Waterway. In 1998, 5.2 million tons of coal moved through the Louisiana waterway system as domestic transshipments.

Coal for export – Coal exports from the lower Mississippi steadily declined from 13.9 to 4.7million tons during 1992-99 period, a decrease of 76 percent. In comparison, for the same period, the decline in total coal exports from the U.S. was more modest- from 102.5 to 58.5 million tons (43 percent decrease). As a result, export market share handled by Louisiana ports declined during the period (*Figure* 2).

Terminal capacities – Major coal export terminals on the Lower Mississippi along with the specifications of major components are shown in Table 14. Three of the facilities are land-based terminals with capabilities for storage, blending, and a variety of cargo transfer options such as from the yard to ship, direct transfer from barge to ship etc. The Cooper/T. Smith facility is a direct-load facility operated with floating cranes. The combined annual tonnage that can be handled by the four facilities is estimated to be 56 million tons. Obviously, the export volumes of coal in the 1990's were too low to utilize the full capacity of the terminals. Fortunately, as the designs of these terminals are suitable for handling other dry-bulk cargos, a gradual diversification of the cargo base ensued from coal to pig iron, barite, cement, steel billets, etc. For example, IMT terminal where coal to other cargo ratio was 70:30 percent 1980's diversified its cargo base to a ratio of 45:55 in 1999, making the coal tonnage less than the other cargo.

Figure 2
Coal Export Trends: U.S. Total and the Lower Mississippi 1992-1999



Emerging Trends – World coal markets were imbalanced for the greater part of the 1990's with supply exceeding demand. As this over supply will continue, U.S. coal exports are projected only to moderately exceed present levels during the next decade[2]. While U.S. coal exporters are efficient producers and supply15 percent of world demand,

Venezuela has negatively impacted U.S. steam coal exports. Export markets for metallurgical coal have been declining because of the expansion of new steel making technologies requiring less high-grade coal.

Overall, Louisiana terminals experienced modest losses in market shares during the period. For example, coal exports from Mobile declined only by an average annual rate of 2.4 percent during the period 1994 to 1998, compared to a decline of 15.4 percent for the local terminals. However, as the coal varieties handled and the time periods involved are short, this cannot be considered as a long-term trend. Further, it is possible that Louisiana coal terminals were able to substitute coal handling with other activities.

[2] U.S. Department of Commerce, International Trade Administration. http://www.ita.doc.gov/td/energy/coalexpt.html

Table 14
Louisiana Coal Terminals

Burnside Bulk Terminal	Cooper/T. Smith	Electro-Coal Transfer		International Marine Terminals
Operating Company: Burnside Bulk Marine Terminal (a division of Ormet) ***Berth Dimensions and Constraints:*** 267.3m length, 14.6m draught. Minimum of two berths available for serving panamax or larger vessels: one shipdock. One midstream buoy system. Barges discharged at landside face of ship wharf or at midstream buoys. ***Dockside Equipment:*** Two 1,000tph grab gantries for vessel loading and discharge, floating crane, conveyors, mobile plant. Annual handling capacity: Total operating capacity in all mineral bulks exceeds 5mta, 42-yard bucket. ***Coal Intake Facilities:*** Direct from ship or barge ***Reloading Facilities:*** Direct from ship to barge, or from storage to ship/barge or rail load station ***Stockyard Capacity:*** 450,000 tonnes ***Stockyard Equipment:*** Stacker, loading shovels ***Largest Vessel to Date:*** *Small Cap*	***Operating Company:*** Cooper/T. Smith ***Berth Dimensions and Constraints:*** 45 ft. draught ***Annual Throughput Capacity:*** 15mta ***Handling Equipment:*** 10 floating clamshell derricks up to 50yd capacity. ***Daily Loading Rate:*** 30,000tpd ***Daily Discharge Rate:*** 30,000tpd ***Discharge Equipment:*** Floating Cranes *Largest Vessel to Date:* 135,000dwt *Other Services:* Barge fleeting, cover handling	***Operating Company:*** Electro-Coal Transfer ***Berth Dimensions and Constraints:*** Dock 1 - 1,880 ft. length; Dock 2 – 1,164 ft. length, draught 55-85 ft. ***Max. Vessel Size/weight/capacity:*** Dock 1 - 950ft, 140ft beam, air draught 55ft. Dock 2 – 750ft, 105ft beam, air draught 75ft. ***Loading Equipment:*** Traveling shiploader, stationary shiploader, two traveling clamshell gantry cranes, two Manitowoc and three midstream cranes. ***Annual Loading Capacity:*** 25mta ***Annual Throughput Rated Capacity:*** 25mta ***Coal Intake Facilities:*** Two clam shell cranes rated at 1,500tph each ***Discharge Equipment:*** Two continuous barge unloaders and two grab bucket unloaders.	***Annual Discharge Capacity:*** 25mta – Maximum discharge capacity 25mta ***Largest Vessel to Date:*** *Jean LD*, length 925m, width 165m, 133,000dwt ***Largest Cargo:*** 120,102 tonnes. ***Stockyard Capacity:*** ***5mt.*** ***Stockyard Equipment:*** Two stacker/reclaimers (bucket wheel) 6,000tph and 4,200tph ***Coal Processing Facilities:*** Three sizes portable screening system, cargo blending with above listed stockyard equipment and river barge unloaders. ***Other Services/Development Plans:*** Blending screening and soft loading services. Barge and tug fleeting service.	***Operating Company:*** International Marine Terminals ***Berth Dimensions and Constraints:*** Two coal loading berths (one traveling and one stationary) Traveling: length of dock 318.9m, 50 ft. draught. ***Loading Equipment:*** One traveling shiploader, one stationary loader, one level luffing crane, ISO 4 floating cranes ***Daily Loading Rate:*** Traveling: 50,000tph, Stationary: 35,000tph ***Annual Loading Capacity:*** 18mta (ground terminal and midstream) ***Coal Intake Facilities:*** Barge/coaster: Barge or vessel uploading available.

Source: *International Bulk Journal, August 1999*

Coal imports to the U.S. increased at an average annual rate of 13.2 percent during the period from 1989-1998, providing a logistical advantage to coastal states with the import terminals. The largest importing states in the Gulf Region are Florida, Louisiana, and Alabama in that order. If imports continue to increase, the current coal movements from Louisiana to utilities in Florida (about 5 million tons) may face market challenges. However, the speed of market adjustments are conditioned by long-term supply contracts in force between suppliers and users.

The substitution of imported coal in domestic markets will result in shrinking demand for transportation and tighter competition between rail and barge operators. Again, these are potential developments and the current market share of imports is very small.

IV.3 Break-bulk and Neo-bulk Terminals

The container, break-bulk and neo-bulk cargos are broadly identified as general cargo. The difference among three categories is: container cargo is in standardized steel containers and measured in twenty equivalent units (TEU); break-bulk cargo can be described as conventional packaged goods, and neo-bulk cargos are large consignments of loose cargo such as steel billets, steel wire coils, sawn timber etc. The classification is important from a cargo handling perspective as port infrastructure requirements and operations will be very different to the requirements for handling bulk cargo.

A functional classification of cargo handled by Louisiana ports in 1999 indicates that 4.3 percent of the tonnage handled falls into this category, with break-bulk and neo-bulk comprising 9.4 million tons (Figures 3 and 4). The typical terminal design for handling general cargo consists of alongside a ship-berth, transit sheds and yard space for storage, and cranes and other cargo handling equipment. Five deep-draft ports in Louisiana (except Port of Plaquemine) have facilities to handle break-bulk and neo-bulk cargo. The Ports of New Orleans and Lake Charles handle more than 98 percent of the cargo (Table 15). A substantial part of this cargo consists of steel billets and coils wire directly transferred from ship to barges.

Large shipments of steel imports made in the latter part of 1990's contributed to rapid growth of neo-bulk cargo. Between 1992/94 and 1997/1999 the tonnage handled doubled (see Table 7). In addition to the cargo that is handled at public terminals, several mid-river rigs also handle steel products. As most steel products need covered storage, bulk of the shipments are directly transferred from ship to barge or rail wherever possible. The break-bulk and neo-bulk terminals are multipurpose terminals that can adapt to variety of operations.

Emerging Trends - The construction and commissioning of the Globalplex terminal in May 2001 resulted in increasing the general cargo handling capacities. The facilities at this terminal consists of 204ft. wide and 690 ft long cargo dock, two new M-2250 Manitowac Electrical Gantry Cranes rated at 150 tons each, and 177,000 square feet of yard space. The construction of a warehouse is in planning stages. The total cost of the project is estimated at $30 million.

However, except for steel products, the markets remained tight for break-bulk and neo-bulk cargos throughout the 1990's. The remarkable growth in steel tonnage favored direct transfers from mid-river rigs using floating cranes on both sides of the vessel. The growth in mid-river rig capacities responding to increases in steel shipments is a classic example of industry adjustment to market needs. As alongside berths did not offer any additional operational advantages in direct cargo transfer their utilization was limited. For example, the general cargo docks at the Port of Greater Baton Rouge handled 222,000 tons in 1999 compared to its typical annual volumes of 600,000 to 700,000 tons. The downward pressure on rates due to fierce competition, and stagnant overseas markets for paper and forest products are among the major factors, affecting break bulk and neo-bulk market.

Table 15
Container, Break-bulk and Neo-bulk cargo Handled by Louisiana Ports in 1999

Port	Container	Neo-bulk/ break-bulk	Total	Share (%)
		(tons)		
New Orleans	3,263,475	7,948,646	11,212,121	87.0
Baton Rouge	---	222,308	222,308	1.7
Lake Charles	288,121	1,083,884	1,372,005	10.7
South Louisiana	----	75,000*	75,000	----
St. Bernard	------	----	----	----
Total	3,551,596	9,329,838	12,881,434	100.0

Notes: (---) no significant amounts, (*) Estimated

Figure 3
Classification of Louisiana Foreign Trade by Cargo Type, 1999

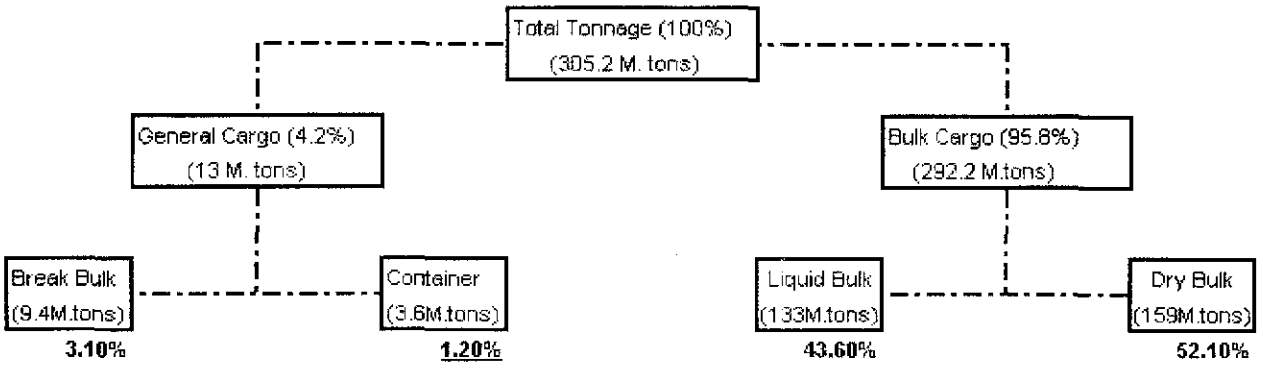
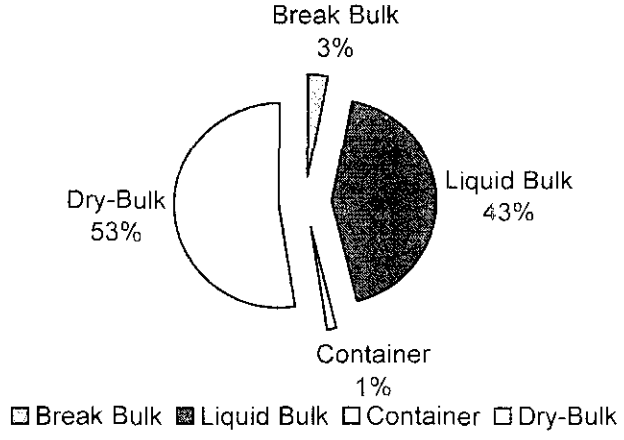


Figure 4
Classification of Cargo by Type 1999



IV.4 Container Cargo

The container volumes handled by the Gulf ports for the period 1993 to 1999 are shown in Table 16. While the total containers handled ranged from 1 to 1.5 million TEU, the largest three ports, namely, Houston, New Orleans and Gulfport, controlled more than 88 percent of the market share throughout the period. During the period the total containers handled by all ports increased by 33 percent, which is an annual growth rate of about 5 percent for the Gulf as a whole. However, the individual performances of ports varied widely as shown in Table 17. The growth rate shown in the first column of Table 15 is computed taking 1993 as the base year and 1999 as the target year. The second column is

the weighted average change for two periods, 1993-1995 base period and 1997-1999 the target period. The weighted average measure is likely to provide more robust trends by avoiding random variations that can occur in one single year. Out of the five largest ports, Freeport, Houston and Gulfport increased their market shares and the market shares of New Orleans and Galveston declined during the period. The annual volumes handled by the three largest container ports in the Gulf and trends are shown in Figure 5.

For handling containers specialized terminals equipped with gantry cranes and yard space is available at the Port of New Orleans at France Road and the new Napoleon Avenue terminals. Consequent to the navigation problems on the MRGO, which were noted earlier in this report, the Port of New Orleans has shifted the emphasis to the Mississippi River terminals. The container terminal capacities currently available at the Port are shown in Table 18. With the addition of new gantry cranes since 1996 at the Napoleon Avenue and Nashville terminals the container handling capacity at the Port has improved substantially. The addition of new cranes, coupled with the conclusion of terminal leasing agreements with P & O Ports and Ceres, the port officials expect container volumes to double within a few years.

Table 16
Container Traffic Handled by Gulf Ports- 1993-1999 (in TEU's)

Port	1999	1998	1997	1996	1995	1994	1993
Beaumont	1,387	1,038	806	971	N/A	N/A	593
Corpus Christy	-	--	--	--	--	921	5,124
Freeport	63,396	54,694	45,135	48,158	30,516	34,062	30,525
Galveston	68,874	13,391	14,376	9,609	40,423	82,212	97,818
Gulfport	125,874	144,961	154,694	153,470	108,096	93,255	89,862
Houston	1,001,170	968,169	935,600	794,481	705,367	579,868	541,497
Lake Charles	19,120	622	34,583	33,549	48,293	9,668	31,627
Manatee	13,368	16,257	16,532	16,088	16,730	13,780	10,722
Mobile	11,184	10,946	11,555	14,360	13,642	11,038	11,653
New Orleans	268,630	244,624	263,851	261,007	198,424	378,334	366,518
St. Bernard	2,976	3,177	N/A	4,341	3,800	N/A	N/A
Tampa	6,905	8,013	2,673	4,616	6,020	6,844	8,000
Gulf total	1,582,884	1,465,892	1,479,805	1,340,650	1,171,311	1,210,982	1,193,939

Source: American Association of Port Authorities

Figure 5
Volumes of Containers Handled by Houston, New Orleans and Gulfport, 1993-1999 (in T.E.U's)

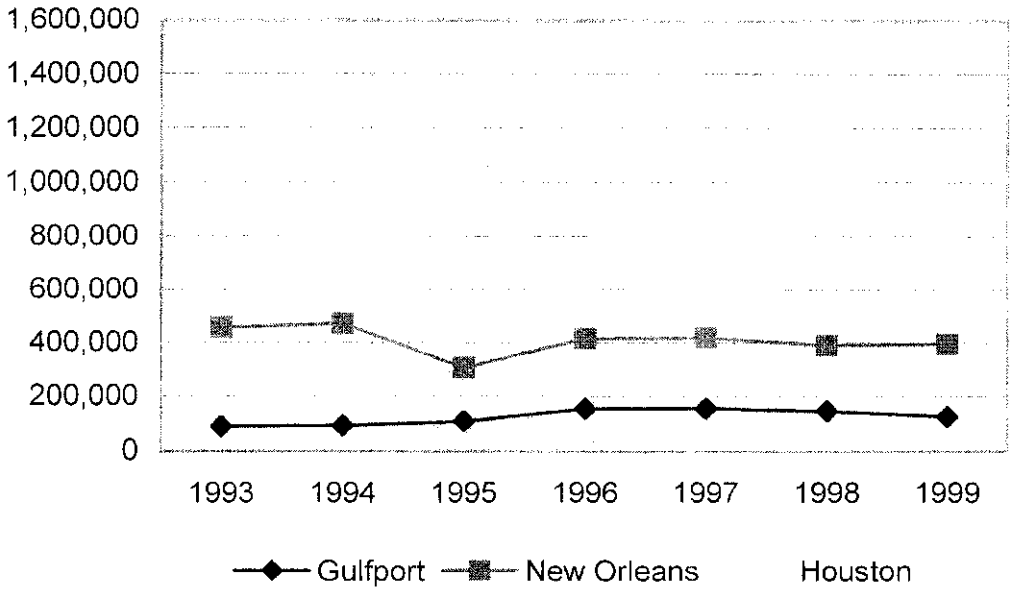
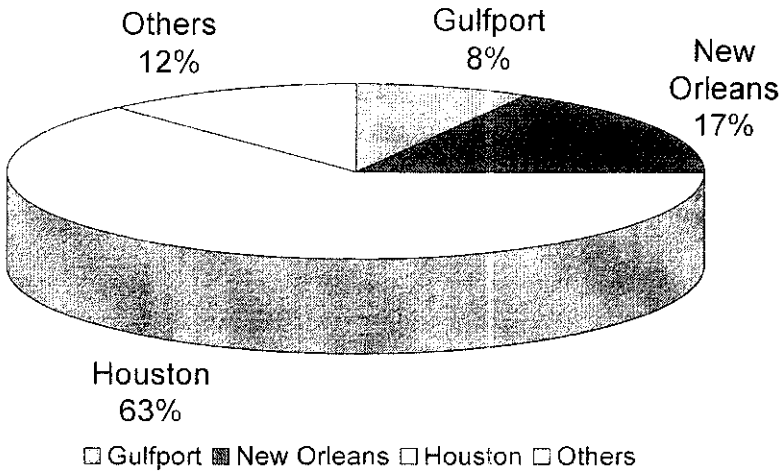


Table 17
Container Growth Rates on the Gulf, 1993 to 1999 (in TEU's)

Port	Change 1993-99 (%)	Change – weighted Average for periods 1993-95 and 1997-99 (%)
Beaumont	133.9	N/A
Corpus Christy	N/A	N/A
Freeport	107.7	71.6
Galveston	-29.6	-56.2
Gulfport	40.1	46.1
Houston	84.9	59.0
Lake Charles	-39.5	-39.4
Manatee	24.7	11.9
Mobile	-4.0	-7.3
New Orleans	-26.7	-17.6
St. Bernard	N/A	N/A
Tampa	-13.7	-15.7
Gulf total	32.6	26.6

Source: Table 14

Figure 6
Container Market Shares of Major Ports in the Gulf of Mexico



In addition, a modest amount of containers was handled at the Port of Lake Charles at a RO/RO terminal without cranes. The Port of South Louisiana has developed the Globalplex Terminal on the Mississippi River equipped with two gantry cranes capable of handling containers.

Additional deep-draft port facilities for handling break-bulk and neo-bulk cargo are available at the six public ports in the state and mid-river terminals operated by the private sector. As the handling of containers, break-bulk (packaged goods not containerized) and neo-bulk (large consignments of loose cargo, e.g., steel billets, coils steel wire, sawn timber, etc.) could be done at terminals with the basic configuration consisting of a ship berth, crane and yard they are also called as multi-use terminals. However, in competitive industries the capacity to handle alone is not sufficient, handling has to be efficient enough to meet and survive market competition.

In 1999 the Louisiana State Legislature took measures to insure Louisiana's competitive position with regard to containerized cargo by creating the Millennium Port Authority. This entity is a political subdivision of the State of Louisiana and is charged with the responsibility to promote the industrial, agricultural and petrochemical base of the Mississippi Valley region of the United States by providing a port with terminal and intermodal facilities for the handling of containerized cargoes of deep draft container vessels. The eleven-member Authority appointed by the Governor is currently examining the concept and approaches to meet the long-term needs of the industry.

The concept of building new port facilities to meet the emerging market needs of the 21st Century embodied in the millennium port concept is based on several market scenarios and the potential future challenges to the industry. The major issues are the following:

Table 18
Capacity of Container Terminals at the Port of New Orleans

Name Location Operator Name	Unit	France Road			New Napoleon (3/02)	
		Berth 1 Sea-Land	Berth 4 Ceres	Berth 5 P&O Ports	Ceres	P&O Ports
Ship's Berthage:						
Effective Transfer Rate	Moves/Hour	35	35	35	40	40
Cranes per Berth		2	3	3	2	2
Effective Transfer Rate per Berth	Moves/Hour	70	105	105	160	160
Working Hours (for vessels)	Hours/Day	24	24	24	24	24
Effective Daily Transfer per Berth	Moves/Day	1,680	2,520	2,520	1,920	1,920
Vessel Load	Moves	900	900	900	900	900
Vessel Stay	Hours	13	9	9	11	11
Preparations	Hours	2	2	2	2	2
Inter-Vessel Time	Hours	12	12	12	6	6
Vessel Cycle Time	Hours	27	23	23	19	19
Berth Utilization		.48	.38	.38	.58	.58
Number of Berths		1	1	1	3	3
Effective Time	Days	158	125	125	193	193
% of 20-foot TEUs/Move		.20	.30	.30	.30	.30
Multiplier		1.80	1.70	1.70	1.70	1.70
Berthage Capacity	TEUS/Year	478,000	537,000	537,000	1,888,000	1,888,000
Storage: Container Yard	Acres	60	37	48	27	27
Weighted Density	Teus/Acre	90	110	85	220	220
Nominal Static Capacity	TEUs	5400	4040	4098	5940	5940
Fraction Required for Empty Boxes		.15	.20	.20	.10	.10
Empty Boxes	TEUs	810	808	820	594	594
Loaded Boxes	TEUs	4590	3232	3278	5346	5346
Modifier for Operating Margins		.8	.8	.8	.8	.8
Effective Static Capacity	TEUs	3672	2586	2623	4277	4277
Avg. Dwell Time	Days	4	4	4	2	2
Peak Factor		1.5	1.5	1.5	1.9	1.9
Turnovers	1/Year	61	61	61	96	96
Yard Capacity	TEUs/Year	223,380	157,306	159,541	410,798	410,798

Vessel Technology – The next generation of container ships with carrying capacities of 4,500-8,500 TEU's will require more efficient and sophisticated terminals with 40ft to 46 ft. depth.

The Hub and Spoke System – The larger new vessels will call at major load-center ports (hub) and smaller feeder vessels will service smaller ports from the hub as in the airline industry.

Port Access – The location of ports closer to the coast and major trade routes minimizing travel time is critical to compete with other ports. Louisiana's competitive position will be adversely affected with the closure of MRGO.

North-South Trade- Gulf Ports are strategically located to benefit from the expanded trade between the U.S. and Latin American countries and a North-South trade corridor will develop across the U.S. linking Canadian markets with Gulf ports.

Several studies completed on this subject support the concept based on projected growth in international trade. However, more empirical studies are necessary to determine the competitive positions of ports, which depends on a complex combination of factors within the country. The time-tested strategy for public planning in such cases is to be guided by the private sector initiatives.

As a part of the Millennium port concept, a private sector proposal to build a container transshipment facility (called 'Sea Point') to be located on the Mississippi River about 95 miles below New Orleans near Head of Passes is under consideration. According to the proposal, the Sea Point will annually handle one million containers aiming to become the predominant Gulf Coast container hub. The facility is estimated to cost $75 million and is expected to be operational by the third quarter of 2002.

V. SHALLOW-DRAFT PORTS

The ports discussed so far are deep-draft ports with access to international trade and are among the largest in the nation in terms of tonnage handled. In addition, there are twenty shallow-draft ports either located on inland waterways or on the coast serving mainly as industrial sites for water-related industries, and servicing the offshore oil and gas industry in the Gulf of Mexico. These ports vary in size, with Port Fourchon and the Port of Iberia generating large economic impacts as bases for the offshore oil and gas industry.

As public ports are statutory authorities created by the Louisiana Legislature for the specific purpose of local economic development, they do not exercise any regulatory control over the private sector. The principal role of public ports is to function as "landlord ports' providing port facilities to the private sector as an incentive to generate economic activity. Port funding for this purpose is derived either from local property taxes, state grants or from self-generated funds. Thus, most shallow-draft ports function

as industrial parks for water related industries and facilitate diversification of the local economy and the creation of jobs in rural communities with limited opportunities. The performance evaluation of these ports cannot be gauged by a single index such as the volume of cargo tonnage handled or the amount of revenue generated. It requires a complex process of evaluation involving economic, social and regional growth factors.

Emerging Issues. As mentioned earlier, the primary mission and the driving force behind shallow-draft port activities is local economic development and they are similar to industrial parks. The main strategy followed to achieve this mission is to attract industries to locate at the port by providing incentives. The procedure of leasing cargo terminals by deep-draft ports to private operators as concession has the same effect. This policy has its positive and negative points.

The positives are:

Mobility of industries – With the development of information technology (IT) industries enjoy wider location choices and incentives will attract these "foot loose" industries.
Trigger-off economic development – For stagnant rural economies with limited opportunities, the jobs created by the new industry may be a catalyst to trigger off economic growth.
Diversification of local economy- New industries diversifying the economy will make economic cycles less painful.

Among the negatives are:

No competitive advantage - Under competitive conditions as all ports provide incentives, the ports with larger resources are at an advantage.
Local infrastructure – Some tax concessions affect local infrastructure – road maintenance and public education
Private capital inflows to the industry will be adversely affected as they have to compete with subsidized industries

VI. COASTAL PORTS

Louisiana is the nation's second largest producer of natural gas and third producer of crude oil among the 50 states. In terms of offshore oil and gas production, the Gulf of Mexico accounts for more than 90 percent of the U.S. production. Three ports, mainly, Port Fourchon, Iberia and Morgan City function as supply bases to this fast growing offshore oil and gas industry in the State. It is easy to emphasize the importance of a logistical support system for an industry with more than 7,000 offshore leases covering more than 30 million offshore acres one hundred miles away from shore, in water more than thirteen-hundred feet deep. The offshore oil and gas platforms service more than 1,750 actively producing oil and gas sites. Further, there are more than 18,000

production wells connected to one another and shore by a web of more than 19,000 miles of undersea pipelines.

The ports remain as the focal points in the logistical support system connecting the land based services with offshore deliveries. Port Fourchon with an access channel to the Gulf 300 ft. wide and 24ft. in depth is the largest supply base acting as the center for variety of services. The port infrastructure includes docks, channels and berths for the vessel interface; cargo handling equipment for cargo transfer; and open and covered space for storage. Similar facilities are available at the Port of Iberia and Morgan City, however, they specialize in fabrication of equipment and supply industries. Port Fourchon functions are more oriented toward that of a cargo and passenger transportation hub.

The operational activities at the above public ports are managed by the private sector, and they have made large investments in the industry. For example, C-port owned and operated by Edison Chouest Offshore constructed in 1996 is a multi-services terminal providing state of the art technical services under one roof. The facility provides vessel services in loading and off-loading, supplies of fuel, water, cements, barites, liquid mud, and completion fuels simultaneously in one stop shopping facility.

The investments made under the Louisiana Ports Construction and Development Priority Program to improve the capacity of offshore oil and gas industries indicate the nature of public/private partnership in the industry (Table 19). While the Program has allocated $30 million in state funds, the sponsoring ports and the private sector also have contributed another $30 million. Louisiana shipbuilding industry and metal fabrication industries are also heavily dependent on offshore oil and gas industry.

Emerging Trends - The rapid expansion of activities has imposed substantial strains on existing transportation systems, water supplies, housing, as well as on law enforcement agencies. The large migrant labor force employed by the offshore oil and gas industry has created pressures on community infrastructures, particularly on local public education systems.

The rapid expansion of the industry has created employment opportunities for the coastal parishes as evidenced by the low rates of unemployment of four to six percent. In addition, metal fabricating industries moved to other inland ports such as Caddo-Bossier and Madison Parish because of the shortage of welders in the area. For orderly development of the region, improved transportation connections remains high priority. This will facilitate not only the movement of freight and passengers, but will also improve mobility in the labor markets.

Table 19
Projects Funded Under Ports Priority Program- Coastal Ports

Port	Type of Projects	# of Projects	Investment Source ($1000)		
			Public	Port/Private	Total
Fourchon	Multi-use docks, slips, and warehouses, etc.	7	16,834	49,977	66,811
Iberia	Tenant facilities, water and sewage, bulkheads, etc.	8	5,319	8,703	14,022
Morgan City	Docks, warehouses, rail and road access, etc.	7	8,338	5,190	13,528

Source: Louisiana Department of Transportation and Development, *Status Report on the Port Construction and Development Priority Program,* March, 2001.

VII. LOUISIANA PORTS CONSTRUCTION AND DEVELOPMENT PROGRAM

The major sources of state funding to the maritime sector are channeled through either the State Capital Outlay Program or through the Louisiana Ports Construction and Development Priority Program (PCDPP) funded under the Transportation Trust Fund. The total funding allocated to shallow and deep-draft ports under the PCDPP, and funding participation by the state and other sources are shown in Table 20. It can be observed that state funds were almost equally allocated to the two categories of ports. Further, it is observed that the Program was able to leverage state funds dollar for dollar by attracting funds from the sponsoring ports and the private sector. Because of the comprehensive project evaluation procedures followed by the PCDPP for funding port projects and its successful functioning for more than ten years, the Program is reckoned as a best practice model in the area of public infrastructure investment for economic development. Several noteworthy features of the Program are as follows[3].

- *Public Participation* – Setting up of Program rules and regulations are done in consultation with the Ports Association of Louisiana (PAL).
- *Leveraging Public Investment* – The port sponsoring the project is required to pay engineering fees and 10 percent of the project cost. A higher weight is given for projects with the private sector participation.
- *Immediate Need for the Project* – All projects must establish the need for the project by under taking an economic evaluation.

[3] For details see, Jay Jayawardana and D. J. Webre "Louisiana Port Priority Program: An application of Benefit-Cost Analysis to Project Appraisal" *Transportation Research Record*, No.1511. Transportation Research Board, National Research Council, National Academy Press, Washington, D.C. 1995, pp. 26-34.

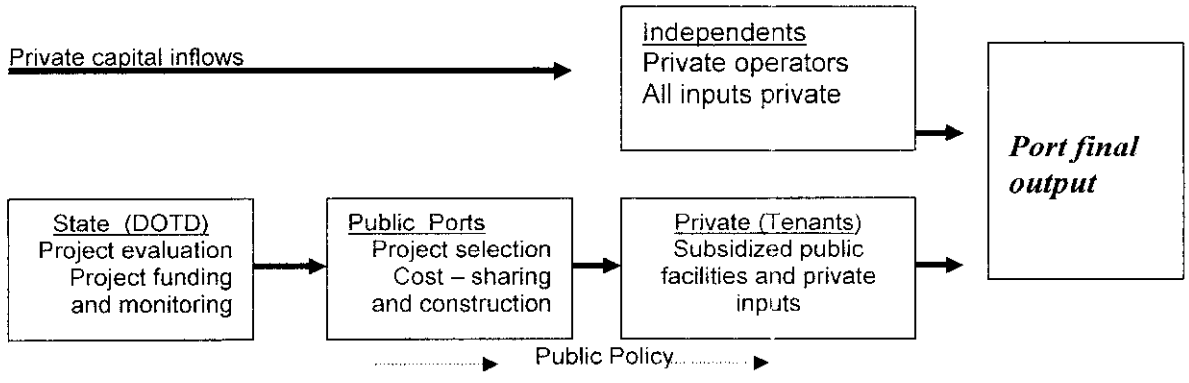
- *The Rate of Return-* all projects must generate a 3.7 percent rate of return on the state investment. This requirement is included to prevent leasing public facilities at rock bottom prices, to the detriment of private sector terminal operations and to provide funds for the maintenance of public facilities.
- *Project Monitoring-* Ports are required to submit reports comparing the project benefits claimed in the application with the actual benefits achieved during the first three years after completion of a project

The functioning of the Program and the roles played by the DOTD, public ports, public port tenants and independent operators are illustrated in a schematic diagram (Figure 7). As the private sector contribution the final output is high, public investment must not discourage private capital inflows to the industry.

Table 20
Port Investments Made Under the Ports Priority Program, 1990-2001, by Shallow and Deep-Draft Ports and by Source of Funds

Port Classification	State Funds	Other Funds	Total
	In 1,000 dollars		
Deep Draft	146,564	154,957	301,521
Shallow-Draft	103,258	151,282	254,540
Total	250,822	307,239	558,061
Funding Shares	Percent		
Deep Draft	58.4	50.0	54.0
Shallow-Draft	41.6	50.0	46.0
Total	100.0	100.0	100.0

Figure 7
Schematic Presentation of Public and Private Sector Contribution to Port Final Output



Emerging trends – The project evaluation methodology followed under the Program has received much recognition at the federal level and in other states. While the program is described and included as a model intermodal program in FHWA website, Arkansas Legislature has approved a similar Program to Arkansas Ports. More importantly, all participating ports in the state approve and direct the Program on sound economic principles. Efforts are underway to expand the same evaluation principle on intermodal projects, which may combine benefits for ports, but also other modes of transportation inclusive of improvements to roads, rail and waterways.

VIII. VALUE TO LOUISIANA

The public port system and waterfront activities along its extensive network of waterways are of great economic significance to Louisiana. Several ports on the Lower Mississippi River are among the largest in the nation, providing access to world markets for agricultural exports and coal from the Mid-Western states and handling the bulk of the nation's iron, steel and crude petroleum imports. The intermodal transportation system comprising the port system along with inland barge operations, and freight rail may be, the world's most efficient bulk cargo handling system. In addition to international trade, the waterfront has developed as a large industrial belt by attracting large oil and gas production and refining plants, petroleum-based chemical industries and service industries supporting oil and gas exploration in the Gulf. Therefore, high levels of productivity in the maritime sector are vital to Louisiana's growth and economic development.

According to estimates made by the School of Business at the University of New Orleans, the port industry continues to contribute significantly to Louisiana's economic growth and development. A study completed for the industry in 2001 assessed the impacts by evaluating: 1) the port industry (firms located in Louisiana because of the existence of ports) and 2) port users (importers and exporters who use the port industry). For each segment direct and secondary spending can be assessed and culminated to reflect the total impact.

According to this study, the port industry contributed over $4.06 billion in direct spending to the economy. When secondary spending created by the direct spending is added, the total economic impact of the port industry (direct spending plus indirect spending) is over $10.65 billion annually. The largest economic impact is derived from port users. Many of these have located their firms in Louisiana because of access to the Mississippi River and the Gulf of Mexico. This group contributes $19.11 billion to the economy and supports 151,055 jobs.

All together, the total economic impact of Louisiana's ports is $29.75 billion. This is 22.5 percent of the state's gross product. The ports generate $5.12 billion in income for Louisiana residents and support 243,621 jobs. The ports also provide income to state and local government through the taxes they generate. In 1999 ports and related activities generated $285.06 million for state government and $137.92 for local government for a total of $422.97 in state and local tax revenue.

Table 21
Summary of Port Economic Impacts 1999

Benefit	Total economic impact	Jobs supported	Taxes generated
Value	$29.5 billion	243,621	$422.97 million

IX. FACILITY REQUIREMENTS

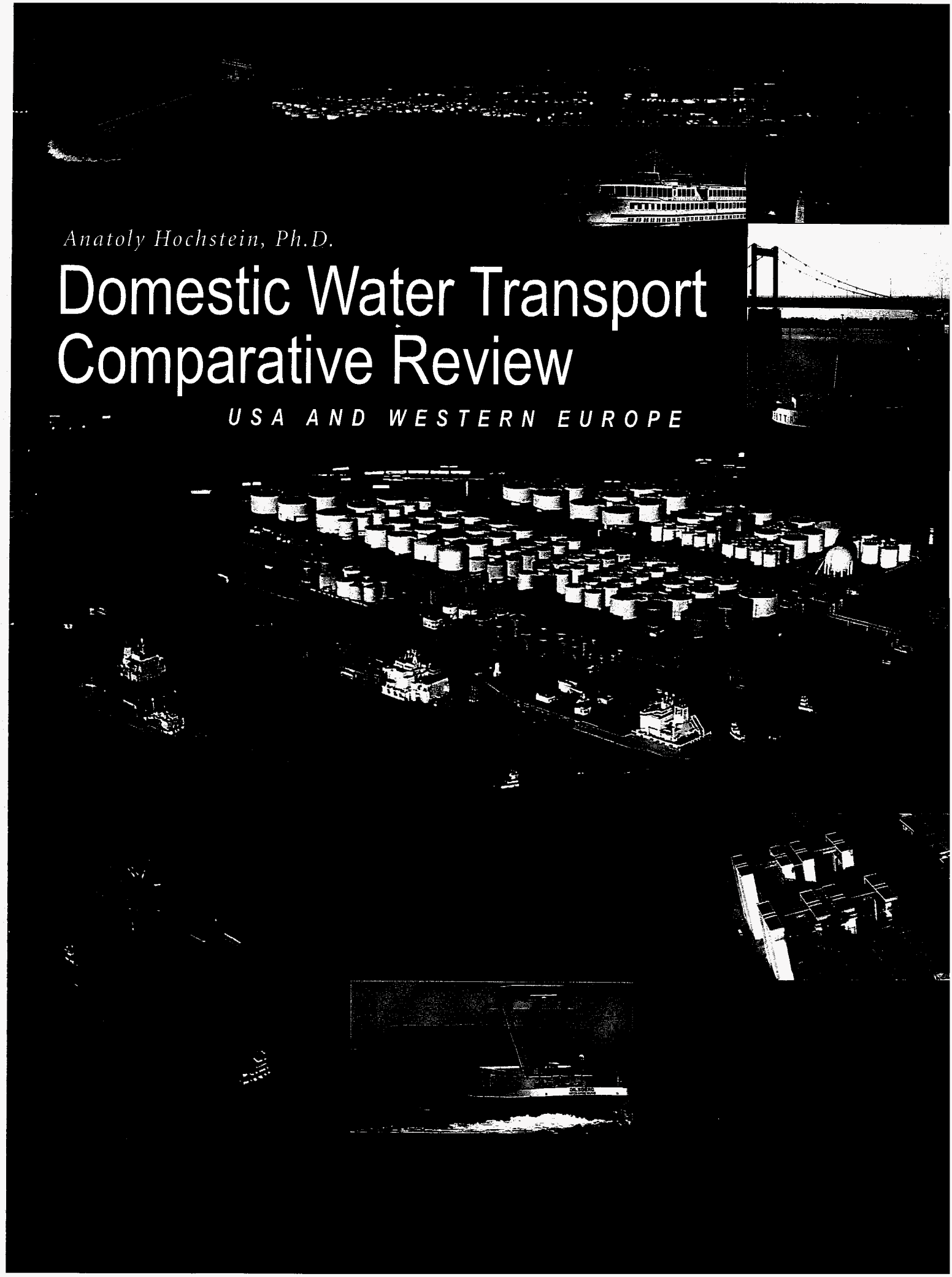
As Louisiana maritime industry is market driven, the facility capacities and requirements will adjust responding to market prices. This is the most robust and enduring system simply because there are innumerable ways to adjust industry capacities: by controlling working hours, handling substitute commodities (e.g., barite for coal), or switching terminal operations (steel imports handling in mid-river rigs), or in the extreme, temporarily closing down facilities during an economic downturn. Under this scenario, infrastructure supply is guided by the market needs as perceived by the investors in the industry.

Further, the industry is based on serving large multinational firms, using state of the art equipment and management systems. In addition there are other smaller private investors who have developed their own niche operations. Therefore, the private sector under competitive conditions and motivated by profit will maintain a high productivity level for the industry.

X. PUBLIC POLICY OPTIONS

In this business environment, the role of the public sector is to play a supporting role to increase productivity and focus on other multiple public objectives such as stimulating the economy, maintain 'business-friendly' public regulation, regional growth, and income redistribution, etc. The design for long-term public policy should be guided by Louisiana's strengths and weaknesses, industry needs, and other development objectives. The policy formulation stages are: to correctly identify the industry problems; determine the desired outcomes; and select appropriate economic tools to achieve the policy objectives. Accordingly, main areas of public policy concerns for the maritime sector are: the development of public transportation infrastructure enhancing industry productivity, joint public/private investment projects, maintaining 'business-friendly' public policies.

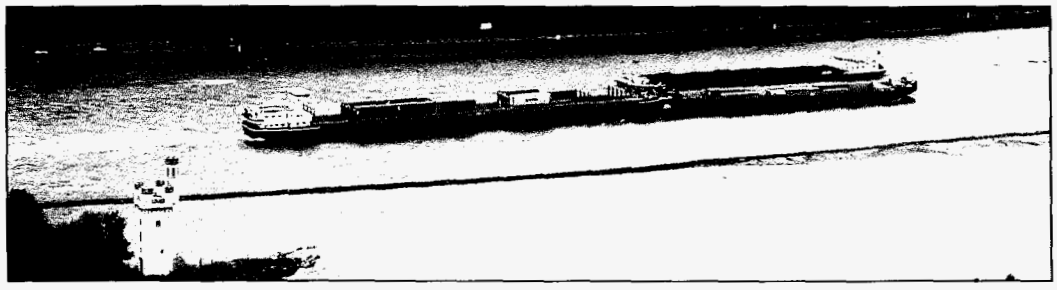
Because of the traditional role of the State as a transportation hub of national significance and the large investments made in the industry, the maritime sector will remain an important part of the Louisiana economy. However, a significant part of the future development depends on strategic directions provided by public policies and the current planning efforts.



Anatoly Hochstein, Ph.D.

Domestic Water Transport Comparative Review

USA AND WESTERN EUROPE



Anatoly Hochstein, Ph.D.

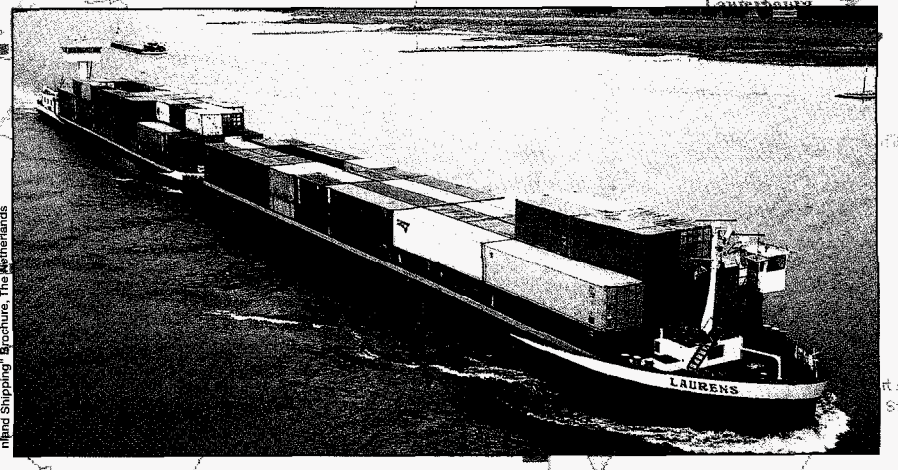
Domestic Water Transport Comparative Review

USA AND WESTERN EUROPE

Contents:

December 2003
Anatoly Hochstein, Ph.D.
Director and Professor, National Ports and Waterways Institute
University of New Orleans

I. Worldwide Trends



Inland Shipping" Brochure, The Netherlands

The United States has the largest and the least expensive Inland Waterway Transport (IWT) system. During 1970–1990, the system experienced a healthy expansion in new construction, and the traffic on the inland waterways increased by about 50%. In the last decade, however, this mode of transportation was practically stagnant, while total national freight traffic increased by 23%. Coastal shipping, another component of domestic water transportation, is in decline.

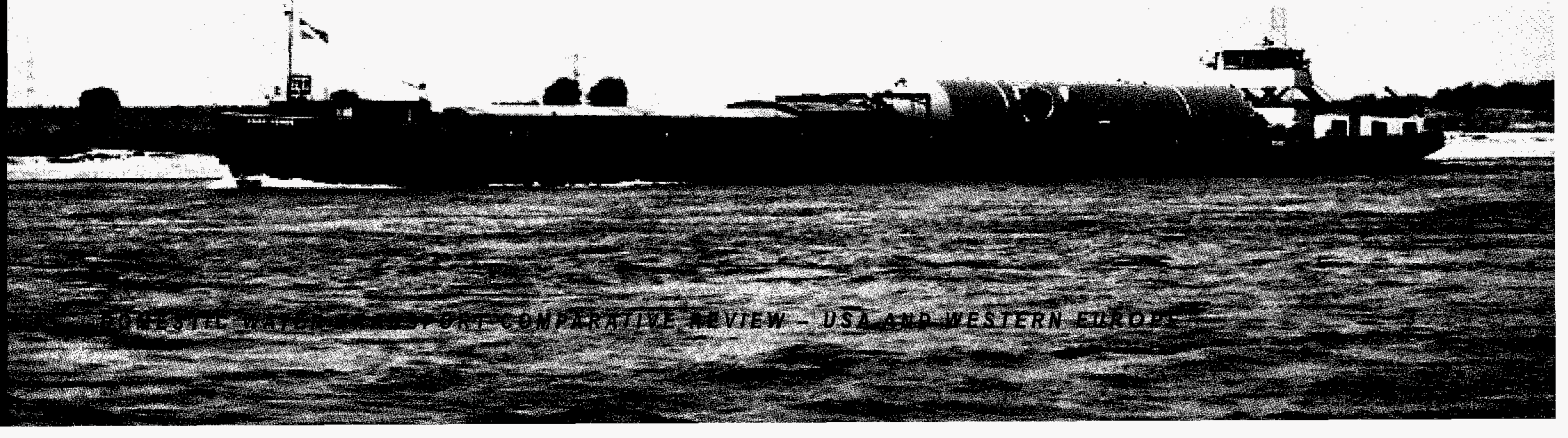
This navigation situation in the United States is in sharp contrast with developments in many other regions of the world, where a renaissance of the inland waterways and coastal shipping is clearly taking place. This trend is observed in both the well-developed countries of Western Europe and in emerging economies of Asia and South America.

In Western Europe, transportation planners and the general public support the trend toward higher utilization of water transportation modes, inland and coastal, recognizing the significance of such factors as:

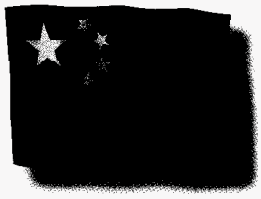
- Congestion of roads and limitations in expanding the road system to meet future transportation demands.
- High level of capacity offered by inland waterways.
- Possibility of integrating inland waterways with coastal ports for coastal and international traffic.
- Environmental and safety advantages in comparison with other modes of transportation.
- Water transportation is a sustainable user (not a consumer) in a multipurpose water resources system.

In countries such as China, Argentina, and Brazil, the IWT has become an important factor in supporting rapid economic growth.

"Policies for expansion of domestic water transportation in the United States are often in sharp contrast with developments in other regions of the world, where a renaissance of the inland waterways and coastal shipping is clearly taking place."

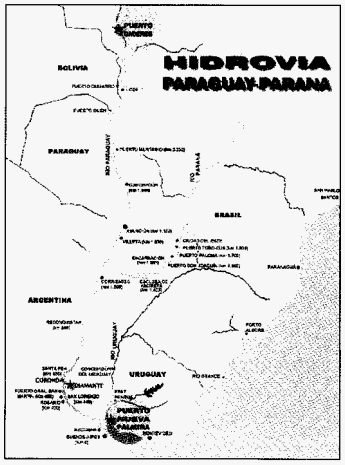


"In China the rapid economic development of Jingsu, Shanghai, Zheijiang and Guangdong provinces ...is to a large extent attributed to the presence of an extensive system of waterways ...with a total length of more than 15,000 miles."



With the beginning of economic liberalization and associated accelerated development, most of these countries have experienced demand that has quickly outpaced transportation infrastructure. Expansion of highway and railroad networks requires huge investments and, no less importantly, takes a long time. The solutions have been provided by the intensified utilization of the waterways, taking advantage of their high level of available capacity, which is nearly unlimited for non-canalized waterways.

For example, in China the rapid economic development of Jingsu, Shanghai, Zheijiang and Guangdong provinces (which then induced economic development in the rest of the country) is to a large extent attributed to the presence of an extensive system of waterways comprised by the Yangtze River, Grand Canal, and a web of many adjacent canals with a total length of more than 15,000 miles.



One of the major recent projects in South America is the improvement of navigation conditions on the Parana–Paraquay waterway system. This system extends for 2,200 miles and crosses five "Mercosul" countries (Uruguay, Argentina, Paraguay, Bolivia, and Brazil). This improvement allows delivery of agricultural products such as soybeans to the international market from regions of Bolivia and Brazil, which until recently were inaccessible due to prohibitively steep overland transportation costs. It should be immediately noted that farmers in the U.S. currently are losing their transportation cost advantage in moving products on the Mississippi

Three Gorges segment of the Yangtze River: site of a hydropower station and navigation locks with 110-meter lift.

waterway system due to congestion at locks.

Accordingly, the attitudes, investments, and future plans for the development of inland waterways and their perceived role in the national transportation system in the United States and in the rest of the world look like opposites at this time. There are substantial differences apparent in both government participation in improvement and maintenance of the waterways infrastructure, and its utilization by the barge and towing industry.

• In the U.S., expenditures for inland waterway maintenance, operation, and new construction at best remain constant and are in danger of being reduced. In the European Union (E.U.) the same expenditures are expected to increase to gain market share from highways. For instance, in

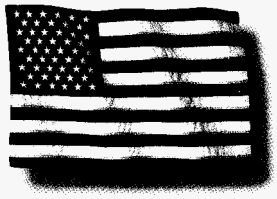
Germany, the waterways' share of total transportation expenditure for the next 10 years is planned to increase by 50%.[1]

• In the U.S., the high cost of recent projects such as the Tennessee-Tombigbee and Red River Waterways has brought severe criticism. No new similar projects are now envisioned. In the E.U., just after completion of the Rhine-Main-Danube waterway, the proposals for other similarly expensive projects, such as the Seine-Nord (the Rhine Basin) connection, are abundant.

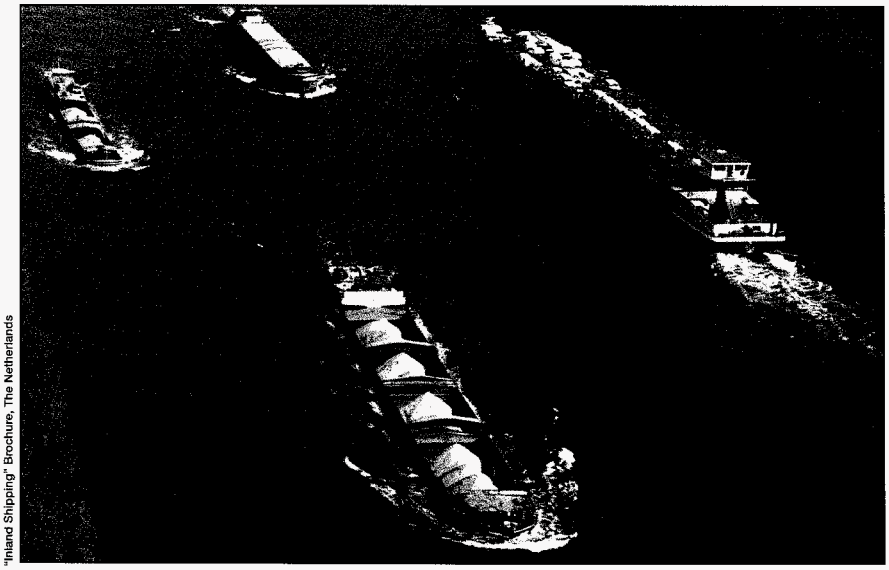
• The U.S. is practically the only country that collects significant user charges, equaling about 20% of the total maintenance and capital costs of waterways. There is continuous pressure to increase user charges. In the E.U., not only are user charges nearly nonexistent, but a system of incentives favoring better utilization of the inland waterways has also been developed.

In light of these considerations, it might be instructive to review how the IWT is perceived by the general public, how it is being utilized by the transportation industry, and what role the government plays in the U.S. in comparison with that of other countries fortunate to have navigable waterways. When comparing aggregated and globalized factors, the conclusions should be approached carefully with an understanding of their qualitative nature and limitations. Each nation experiences its own economic and social development and sets its own priorities. At the same time some countries, especially in the E.U., are similar to the U.S. in economic conditions overall and in transportation demand specifically. Still there are principal differences in policies for waterways utilization.

Accordingly, the objective of this paper is to review public policies, motivations for their formulation and actual implementation for development of domestic water transportation in other, primarily Western European, countries. This review in turn may contribute to an examination of existing trends and policies in the United States.



"The U.S. collects significant charges from users of waterways. In the E.U. not only are user charges nearly nonexistent, but a system of incentives, favoring better utilization of the inland waterways, has also been developed."



"Inland Shipping" Brochure, The Netherlands

Inland waterways are most suitable in transporting large quantities of bulk cargoes such as grain, coal, petroleum and construction materials. Lately, however, services by inland operators in both the E.U. and the U.S. are becoming more diversified, attracting cargoes traditionally moved by land modes of transportation.

Inland waterways are indispensable in delivering oversized units, which are difficult to accommodate on other modes of transportation.

"Inland Shipping" Brochure, The Netherlands

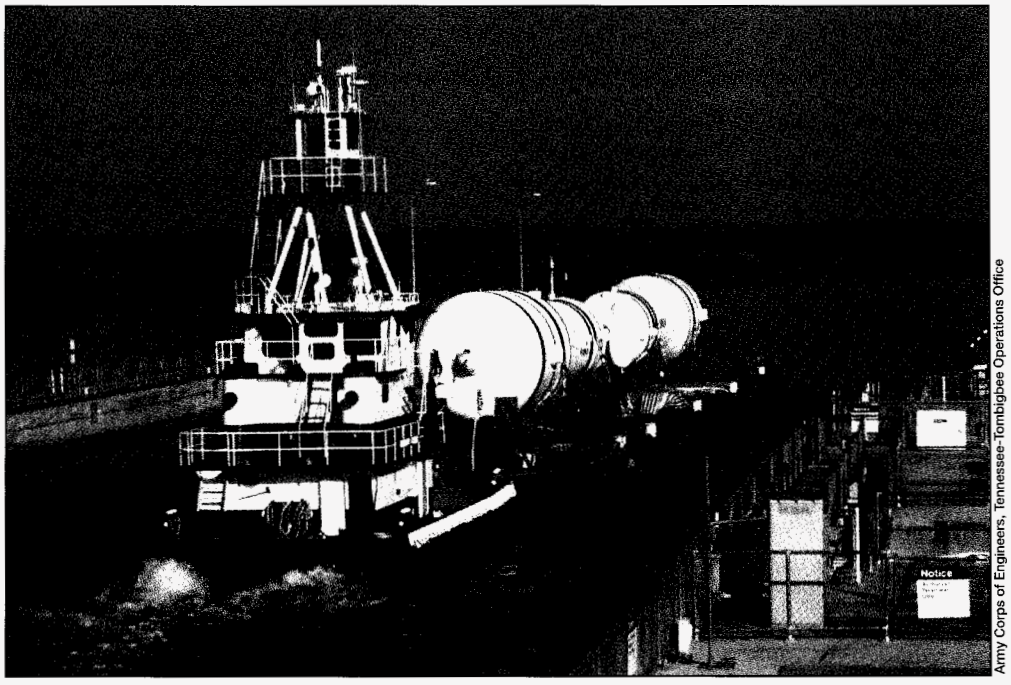
A tandem of two barges transports the center span of a bridge along a waterway in Germany.

Barges are frequently utilized to move bridge and tunnel sections, airplanes and space vehicles, boilers, turbines, or other heavy or extra-large components.

"Inland Shipping" Brochure, The Netherlands

A barge moves the fuselage of a Boeing 747 under a Rhine River bridge.

A tug and barge with two nuclear turbines, built in South Korea and shipped to New Orleans, transits a lock on the Tennessee-Tombigbee Waterway en route to the Sequoia power plant in Tennessee.



Army Corps of Engineers, Tennessee-Tombigbee Operations Office

II. Comparative Characteristics of Inland Water Transport in the U.S. and Western Europe

Configuration.

The major segments of the inland waterways system in the U.S. are comprised of large rivers, principally the Mississippi and Ohio. The basic modernization of the system occurred relatively recently, starting in the 1930s. As a result, this system provides channel dimensions enabling users to deploy the most economical fleet of the largest pushed tows in the world. These tows commonly can carry about 22,000 tons in the Upper Mississippi and as much as 60,000 tons in the Lower Mississippi waterways.

Most European waterways were built in the 18th and 19th Centuries with extremely restricted dimensions by modern standards, allowing a maximum vessel size of 300 tons to 500 tons. After World

"In the U.S., expenditures for inland waterways maintenance, operation, and new construction at best remain constant and in danger of being reduced."

American Commercial Barge Line LLC

The U.S inland waterways system provides channel dimensions which enable users to deploy the most economical fleet of the largest pushed tows in the world. A tow of 40 barges with 60,000 tons (above) moves down the Lower Mississippi River.

War II, European waterways went through a large scale and expensive modernization. Currently, major international waterways in Europe, such as the Rhine waterway system, permit the movement of self-propelled vessels between 1,500 tons and 3,000 tons and tows up to 16,000 tons, still much smaller than in the U.S. Significant parts of European waterways remain restricted to their original size, especially many man-made canals and small rivers.

The advantages in physical configuration make the IWT not only the least expensive mode of transportation in the U.S. (with costs averaging 10 times less than trucks and four times less than rail) but also the least expensive among other well developed waterway systems in the world. The IWT costs in Europe per ton-mile average five to10 times higher than in the U.S.[2]

System Utilization.

Figure 1 provides a summary of parameters defining performance characteristics of both systems. One significant difference between overall multimodal transportation systems in the U.S. and Western Europe is in modal shares. In Western Europe, road transportation is the prevailing mode, responsible for 73% of the total volume of traffic, expressed in ton-kilometers (with exclusion of short sea and coastwise traffic between E.U. member states). Rail is mostly focused on passengers, and its share of freight traffic is very modest. At

"Configuration and waterway dimensions make inland waterways in the U.S. not only the least expensive among other modes of transportation but also the least expensive among other waterway systems in the world."

14%, the total rail freight modal share in the E.U. is only half that of the U.S. In cost and performance, the European rail network is much inferior to the North American rail system in carrying national freight. Large block

Figure 1. Comparative Review

	U.S.	E.U.
Ton-km, billions	470	
Length in use, 1000 km	40	
Self-propelled units, thousands	5 (towboats)	
Barges, units, thousands	29	
Modal Share		
IWT (ton-km), %	10 (a)	
Road	28 (b)	
Rail	37 (c)	
Coastwise	8	
Total Domestic Water	18	
Average Annual Growth Rates (ton-km, 1990-98), %		
IWT	0.1	
Road	4.3	
Rail	3.6	
Coastwise	-5.1	
Total Growth (ton-km, 1990-98), %		
IWT	0.9	
Road	40	
Rail	33	
Coastwise	-34	

Notes: (a) Inland and Great Lakes
(b) Intercity trucks
(c) First Class Rail
(d) Excluding/Including coastwise traffic (short sea)

Sources: The European Commission Transportation Statistics Annual Report;
U.S. Department of Transportation.

Some European waterways remain as they were built in the 18th and 19th Centuries with extremely restricted dimensions by modern standards.

"Inland Shipping" Brochure, The Netherlands

A chemical barge on a waterway in the Netherlands countryside.

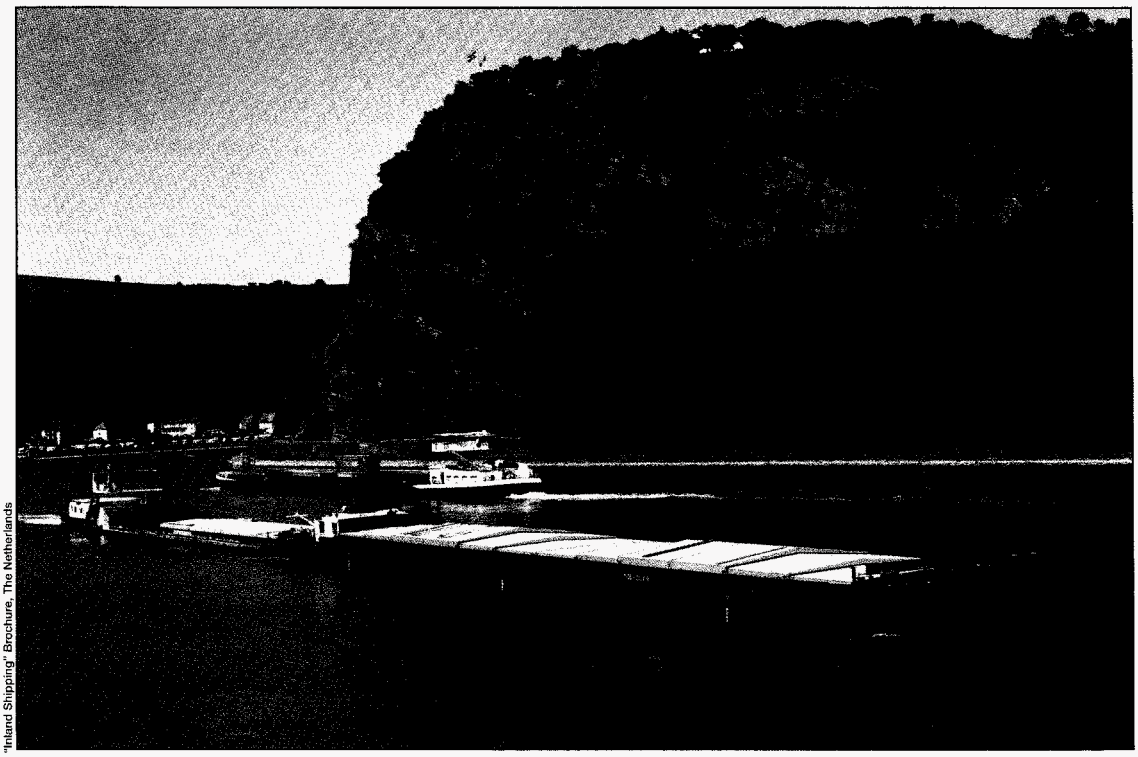
World Wide Waterways

The container barge Carina squeezes between the quays of the Schelde at Tournai, Belgium, en route from Lillie to Antwerp.

trains, double-stack trains, intermodal operation, interlining and similar innovations which distinguish American railroads, are limited in Europe. Most of the freight rail lines are losing money; and utilization of foreign tracks is still a problem between the E.U. countries. Restructuring of international railroad operation for freight traffic in Europe is pending. In the meantime, excessive use of roads for freight traffic remains a major problem.

"The average traffic density in the E.U. is 4 million tons per kilometer, while in the U.S. it is close to 12 million tons per kilometer, or three times higher."

At present, European roads in general are more congested and have even less ability to expand than in the U.S. in terms of land availability, environmental and safety consequences, etc. In this regard, the situation in Western Europe is an illustration of what is coming in the U.S. in the near future. Efforts to shift freight traffic from roads to rail and water, both inland and coastal, are the most important factor in the formulation of freight transportation policies in the E.U. countries. It should be immediately noted that in the U.S., with more balanced and nearly equal freight market shares between rail and

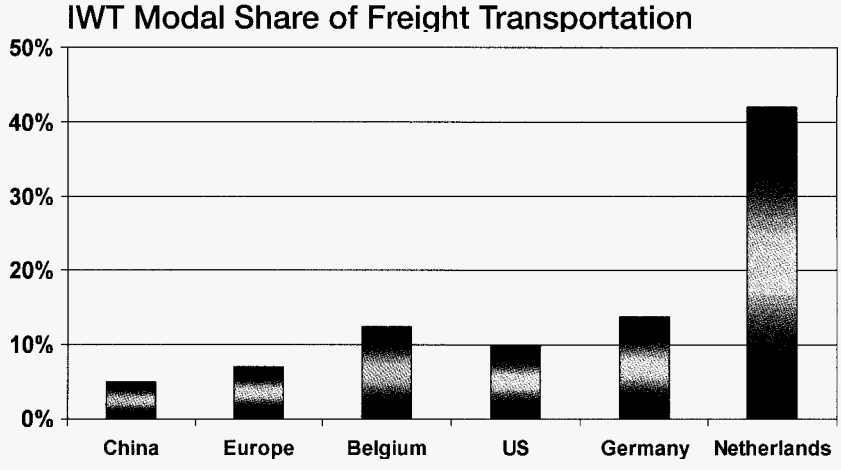


"Inland Shipping" Brochure, The Netherlands

As a result of modernization, major international waterways in Europe accommodate pushed tows moving up to 16,000 tons. Here a Rhine River tow passes fabled Lorelei rock near Koblenz, Germany.

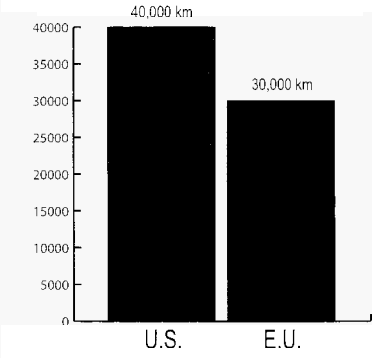
roads, water transport is the only mode lacking substantial participation in intermodal operations.

The total network of inland waterways in the U.S. is more than 30% longer (40,000 km) than in the E.U. (30,000 km). As mentioned above, the dimensions of waterways in the U.S. are also, in general, considerably larger. The average traffic density in the E.U. is 4 million tons per kilometer, while in the U.S. it is close to 12 million tons per kilometer, or three times higher. The total traffic share by inland water transport in the E.U. is 7%; and in the U.S. it is 10%, or more than 40% higher. On both continents, however, the modal share is much higher in areas where waterways are prominent. For example, the inland waterway share is 42% in the Netherlands, 13.7% in Germany, and 12.5% in Belgium.



The information presented above clearly leads to the conclusion that, in general, the inland waterway system in the U.S. represents an even more valuable national asset than in the

Total network of inland waterways

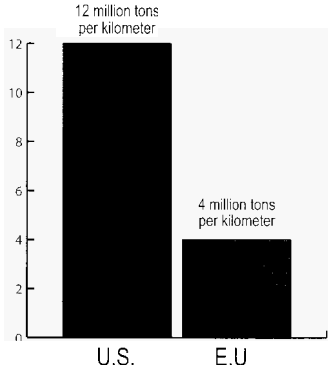


E.U. This is true in terms of the system dimensions, costs of service, traffic density and modal share.

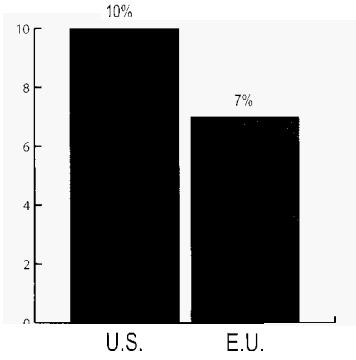
This statement, however, requires an important exception. Inland water transport in Europe is superior in its diversity of services. The U.S. waterway operation consists almost exclusively of dry cargo and tank barges moved in large tows. This provides for low cost of service and the ability to move large volumes of bulk cargoes, but the system's participation in the national intermodal system is severely limited. In the E.U., along with barges there is a large fleet of self-propelled cargo vessels, many of them moving containerized cargos. The market share in ton-kilometers between barges and self-propelled vessels in the E.U. is about 50/50.

The concepts of "container on barge" and "river-ocean" fleets can illustrate the difference in the scope of services. As a result of concentrated efforts to divert trucks from roads, about 30% of all container traffic to/from European ports on the northern coast is presently carried by the inland fleet. A combination of relatively low rates, reliable schedules, efficient vessels, and a network of inland transfer facilities allows the diversion of millions of containers from roads to water. In the largest European port hub at Rotterdam, 40% of all containers is moved by

Average Traffic Density



Total traffic share by inland waterway transport



inland waterways, a 3% increase in the last year alone, all at the expense of trucking. Another example is a rapid increase of container-on-barge services on the Seine River between Paris and Le Havre. Despite four-lane highways, this route experiences chronic congestion, especially for trucks getting into and out of Paris. The barge delivery proved to be so effective in this situation that container throughput at the Paris terminal in 2000 increased by a staggering 55%.[3]

In the U.S., many attempts to establish a container-on-barge system on the Mississippi waterway system have not attained much success. This service, provided by river barges, only

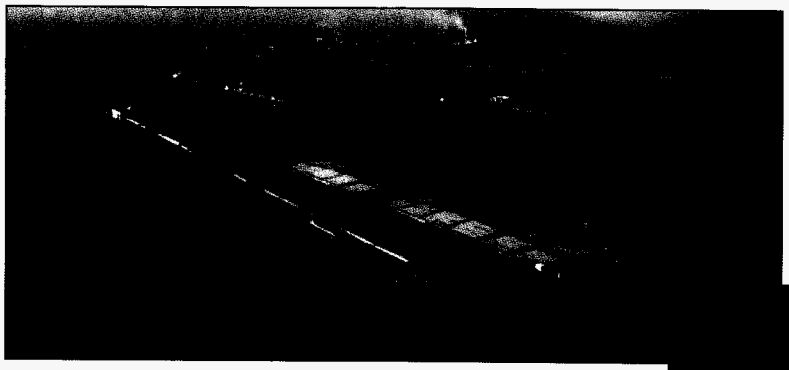
"In the E.U. short-sea and coastal shipping between member states, across the North Sea and along the coasts, has experienced rapid growth in the last decade; in the U.S. in the same period coastwise traffic has declined."

exists in the Columbia-Snake river system and on the Gulf Intracoastal Waterway (as well as along the coast) between Houston and New Orleans. Both services in terms of TEU (20-foot equivalent units) represent a small fraction of the container volume moved along the Rhine waterway system in Europe.[4]

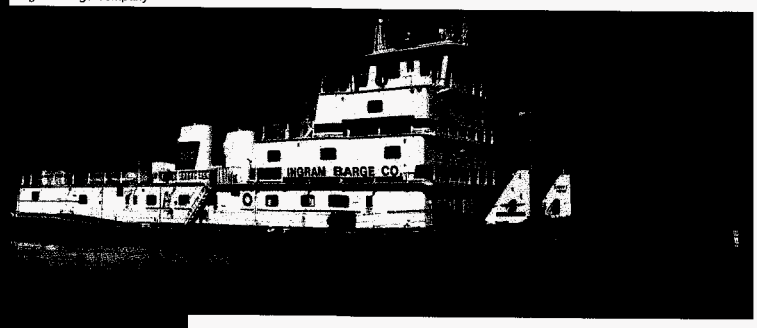
To a large extent, the success of container-on-barge services in Europe is attributed to public policies implemented by the E.U. and member states. These policies, addressed in more detail below, include both the restriction of road traffic and assistance to the inland waterway industry. The movement of heavy truckloads on the E.U. roads is prohibited on weekends, and there is a gradually increasing system of taxation and fees to discourage truck traffic. The waterways at the same time receive development grants and credits for reduction of environmental impacts and better safety. The waterways are also specifically included in the so-called Trans-European and Pan European intermodal corridors, which are scheduled for priority financing.

A failure to expand container-on-barge operations in the U.S. also can be largely attributed to public policies (or lack of them) toward waterways. These include prohibitive crew-size requirements and cost as well as high pilotage fees for self-propelled vessels on certain segments of the inland waterways, practically no participation of inland waterways in any intermodal programs, and a lack of financial incentives for diverting cargoes from roads to water. In many instances, investments in the water transportation projects, both inland and coastal, may lead to public benefits generated by reduction of road congestion as well as other environment and safety advantages. Unlike the European practice, however, in the U.S. there is no mechanism to account for these benefits in the allocation of public transportation funds.

"Inland Shipping" Brochure, The Netherlands



Ingram Barge Company



"Inland Shipping" Brochure, The Netherlands

The U.S. inland fleet consists nearly exclusively of barges and push boats, like the line-haul towboat at right. In Europe, the inland fleet is about equally split between push boats and self-propelled vessels.

Rates of Growth

In the last decade, the rates of traffic growth on inland waterways have been slow in both the U.S. and in the E.U. However, although small in absolute value, in comparison, European waterways are more successful in gaining volumes of cargo. While in the U.S. waterway traffic was practically stagnant, in the E.U. it has expanded with a 0.3% current annual rate of growth. The most drastic difference exists in the deployment of coastwise shipping. In the E.U., shipping between member states by water (across the North Sea and along the coasts) has experienced rapid growth in the last decade, 27% in the last eight years, second only to roads with a 32% increase. In the U.S. in the same period, coastwise traffic has declined by more that 50%. In contrast to

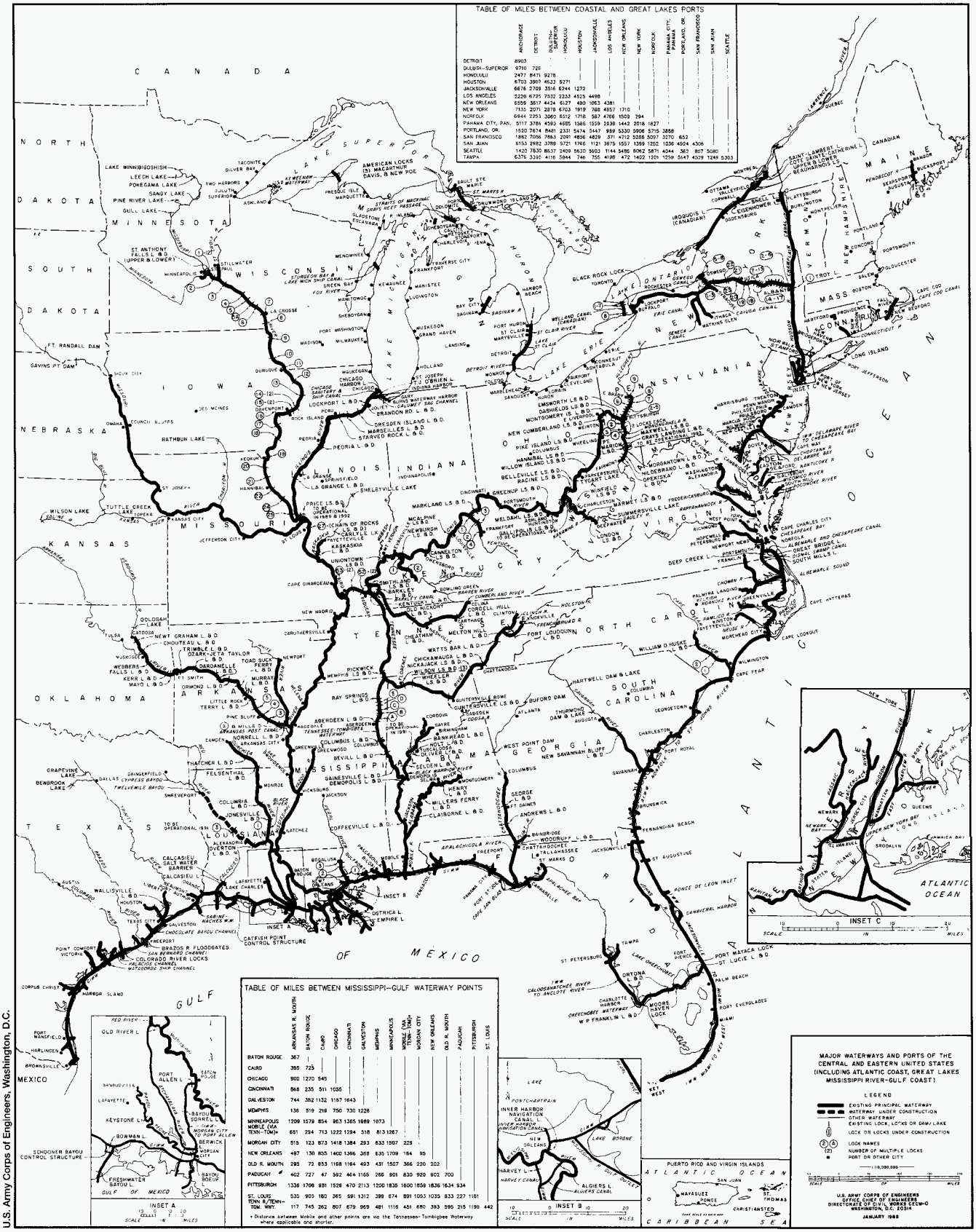
Continued on page 16

Western European Waterways

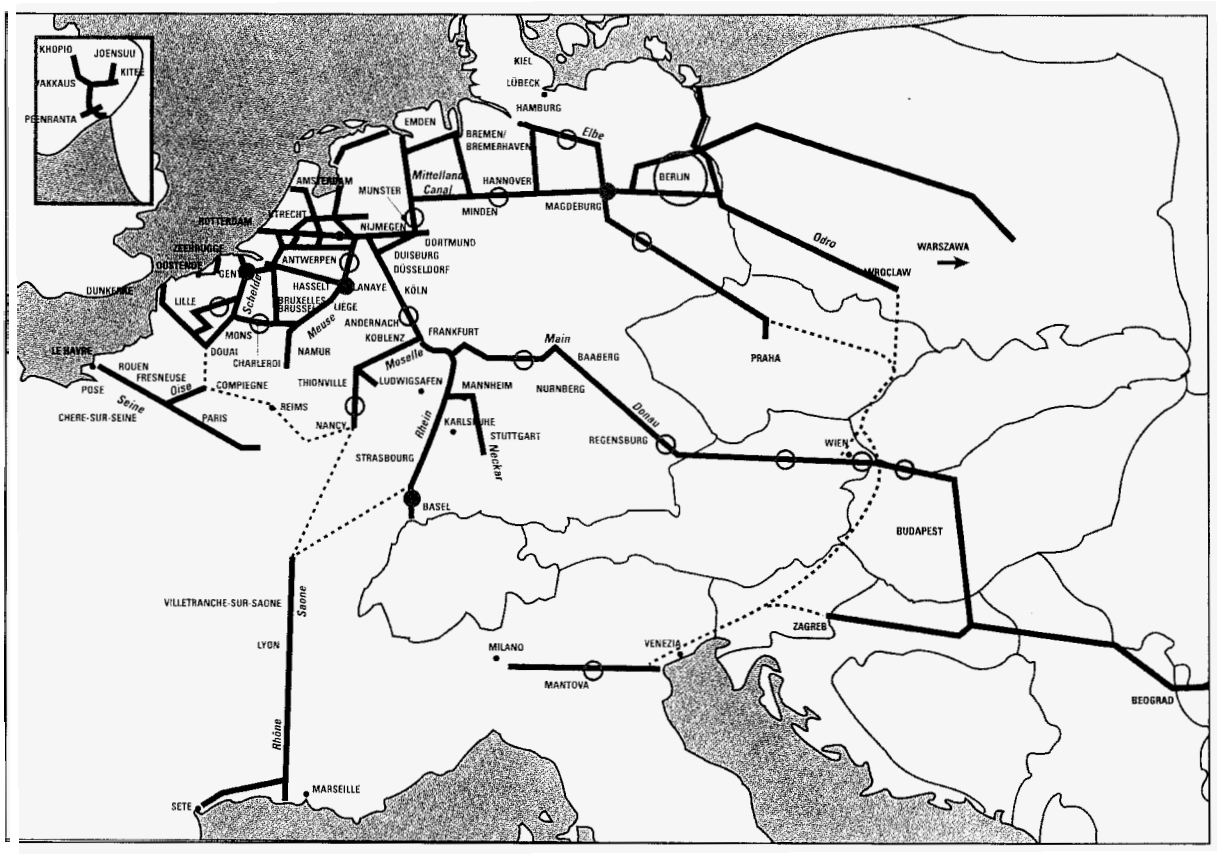
Source: L'Europe Fluviale

The main waterway of the Western European system, the Rhine River, rises in the Swiss Alps and flows 820 miles to the North Sea. The river is navigable from Basel, Switzerland, to Rotterdam, the Netherlands, a distance of some 500 miles. The other principal rivers of Western Europe, including the Danube, Elbe, Ems, Rhone and Soane, are linked to the Rhine by networks of rivers and canals.

U.S. Midcontinental Waterways



U.S. Army Corps of Engineers, Washington, D.C.



Plans for inland waterways improvements by 2010 in the framework of Trans-European Transportation Network (TEN). Circles indicate proposed improvements.

Continued from page 14

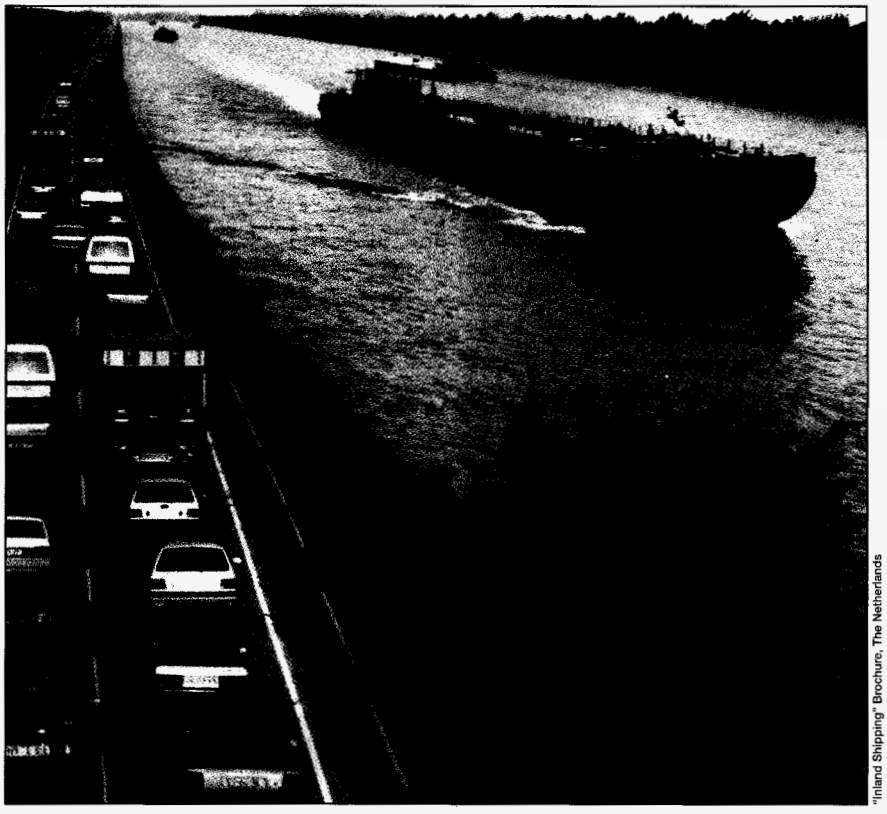
domestic water transportation, both roads and rail in the U.S. have had extensive expansion in the past eight years, 40% and 33% respectively. In the E.U., most freight transportation growth has been accommodated by roads and coastwise shipping, while rail continues to decline.

Also, as indicated above, there have been structural changes in the European IWT with its inclusion in intermodal activities and attraction of higher-value container trade. Still, the inability to reduce traffic on the road system and divert freight from trucks to rail and water remains a major concern for transportation planners in the E.U. The focus of most of the strategies formulated and implemented in Europe is to achieve this goal.

III. Formulation of Policy Directions

Documents Defining E.U. Transportation Policy.

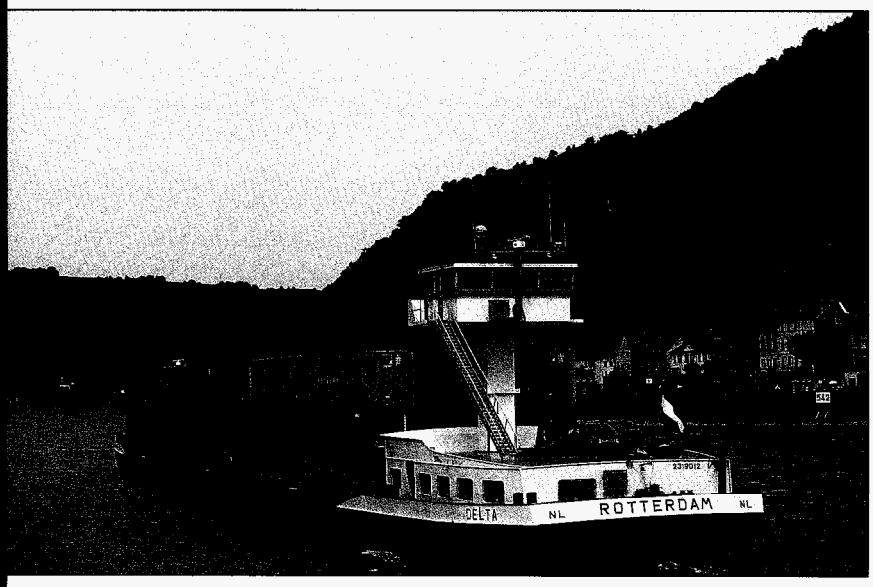
The basic principles for development of a multimodal transportation system in the E.U. were formulated in its so-called White Paper, issued first in 1992 by the European Council (E.C.) (COM (92) 494). These principles have been reaffirmed in several subsequent documents, including the Council Regulation of October 1998 (EC No. 2196198) concerning the granting of financial assistance for actions of an innovative nature to promote combined transport (Council Resolution of February 14, 2000) on the promotion of intermobility and intermodal freight in the E.U. (OJC 56, 29.02.2000), and finally, the most recent political guidance issued by the E.C. in June 2001 (Gotenburg European Council). As a basis for formulating this political guidance, the European Commission published in September 2001 a new, updated



"Inland Shipping" Brochure, The Netherlands

Road congestion generates public support for better utilization of waterways in both the United States and the European Union.

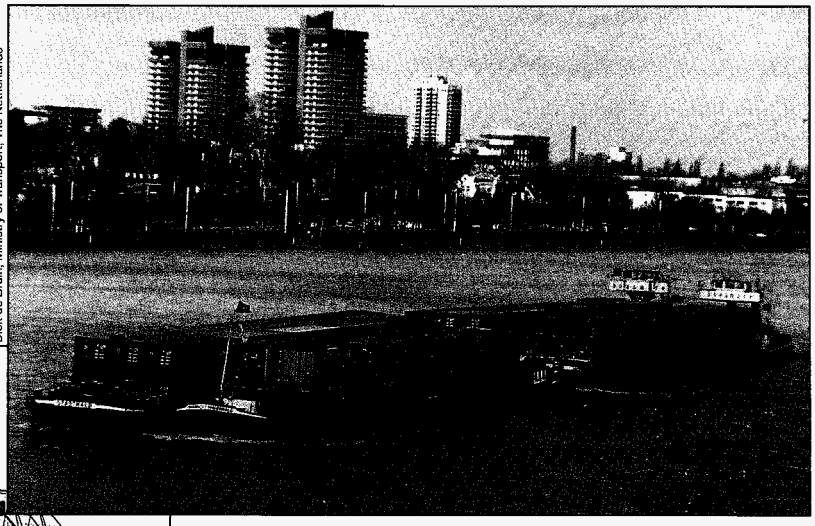
Container on barge has become a major component of the E.U. intermodal transportation system.



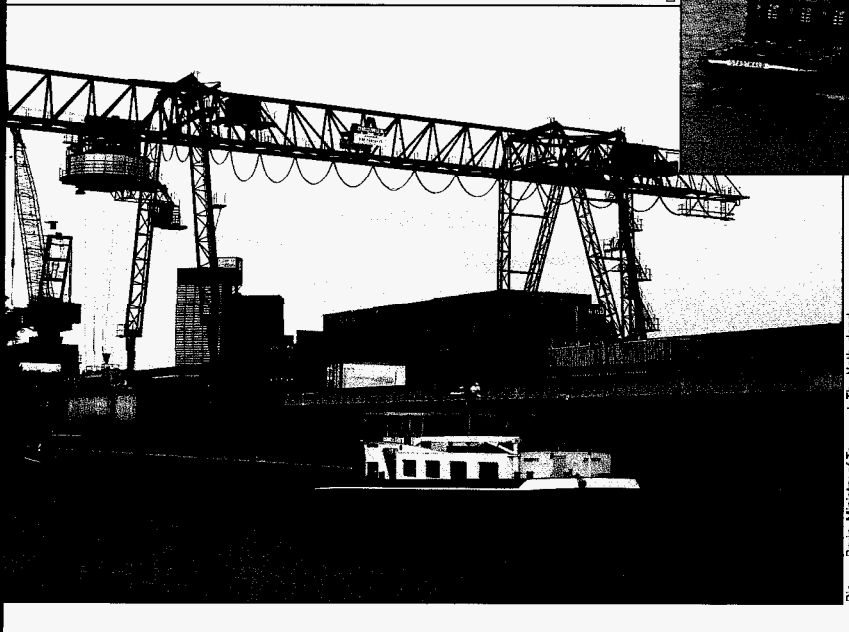
Dick de Bruin, Ministry of Transport, The Netherlands

A self-propelled vessel with retractable pilot house carries a load of containers on the Rhine River in Germany.

A four- barge container "train" with two self-propelled and two push units.



Dick de Bruin, Ministry of Transport, The Netherlands



Dick de Bruin, Ministry of Transport, The Netherland

Loading containers in a river port, Nijmegen, on the Waal River in the Netherlands. The biggest container vessel has a length of 135 meters, a beam of 17 meters and carrying capacity of no less than 470 TEU. The smallest container vessel is 66 meters long, with a beam of 6.6 meters and carrying capacity of 24 TEU.

"The newest version of the E.U. transportation policy paper explicitly calls for 'a shift of balance between the modes by way of an investment policy geared to the railways, inland waterways, short-sea shipping and intermodal operations'."

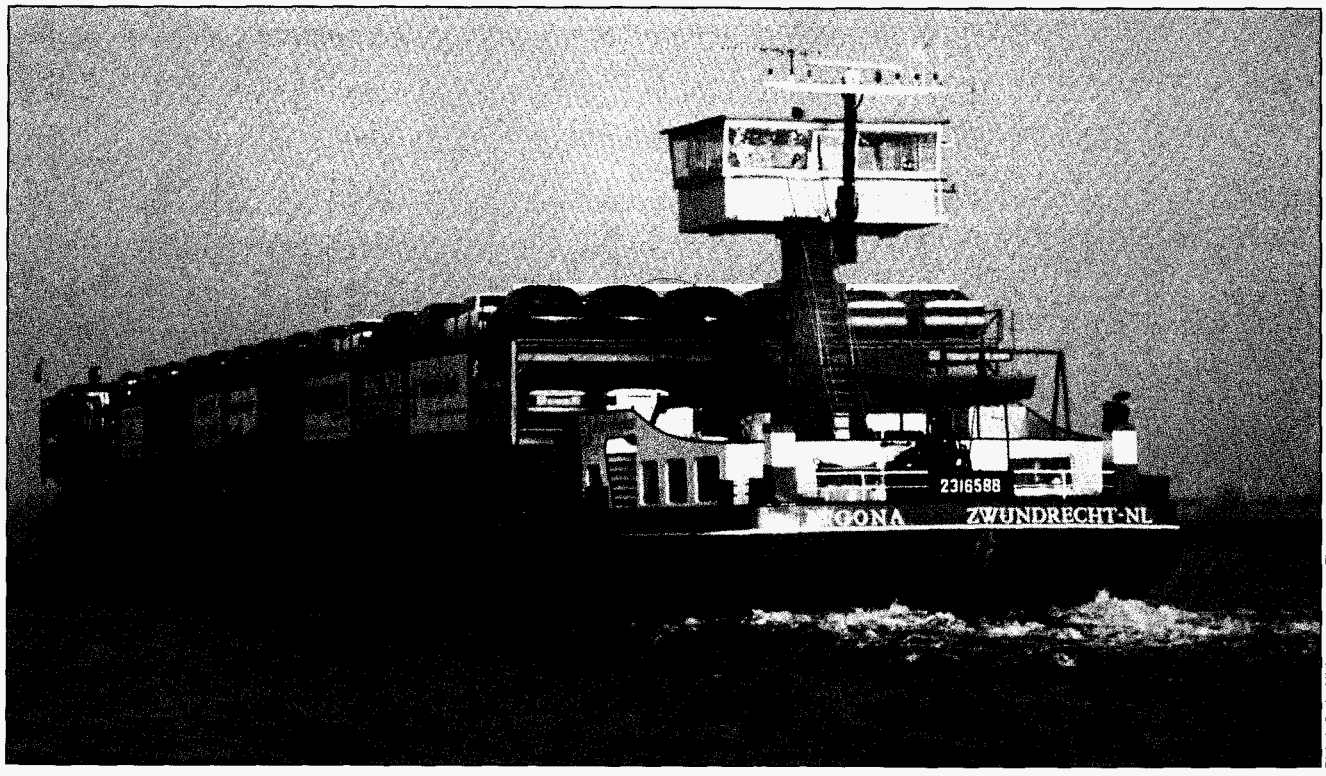
version of the White Paper, titled "European Transport Policy for 2010: Time to Decide."

All the above documents advocate achievement of sustainable mobility by supporting an integrated, competitive, efficient, and safe transport system that is friendly to the environment and makes use of the best technologies. Against this backdrop, inland waterway and coastal transport is recognized as the mode offering major advantages, as it is environmentally friendly, with a high level of safety, economical in nonrenewable energy and helps to relieve the overloaded highway network.

Both the original White Paper and the latest Council Resolutions specifically stated a determination "to promote transport modes contributing to sustainable transport, in particular rail transport, short-sea shipping and inland navigating." The Gotenburg political guidance similarly suggested that "action is needed to bring about a significant decoupling of transport growth and GDP growth in particular by a shift from road to rail, water and public passenger transport."

The newest version of the White Paper explicitly calls for "a shift of balance between the modes by way of an investment policy in infrastructure geared to the railways, inland waterways, short-sea shipping and intermodal operations." This White Paper recommended implementation of more than 60 measures to achieve better balance between modes of transportation which are possible without any need to restrict the

Self- propelled vessel for autos with advertisements alongside in the Netherlands.



Dick de Bruin, Ministry of Transport, The Netherlands

mobility of people and goods. The objective is to slow growth in road haulage by better use of the other means of transport and to reduce current projected increases in road transportation in the period 1998–2010 from 50% to 38%. One of the principal groups of measures, as defined by the latest White Paper, is "Promoting transport by sea and inland waterways."

Fulton Lock/Anthony Beene

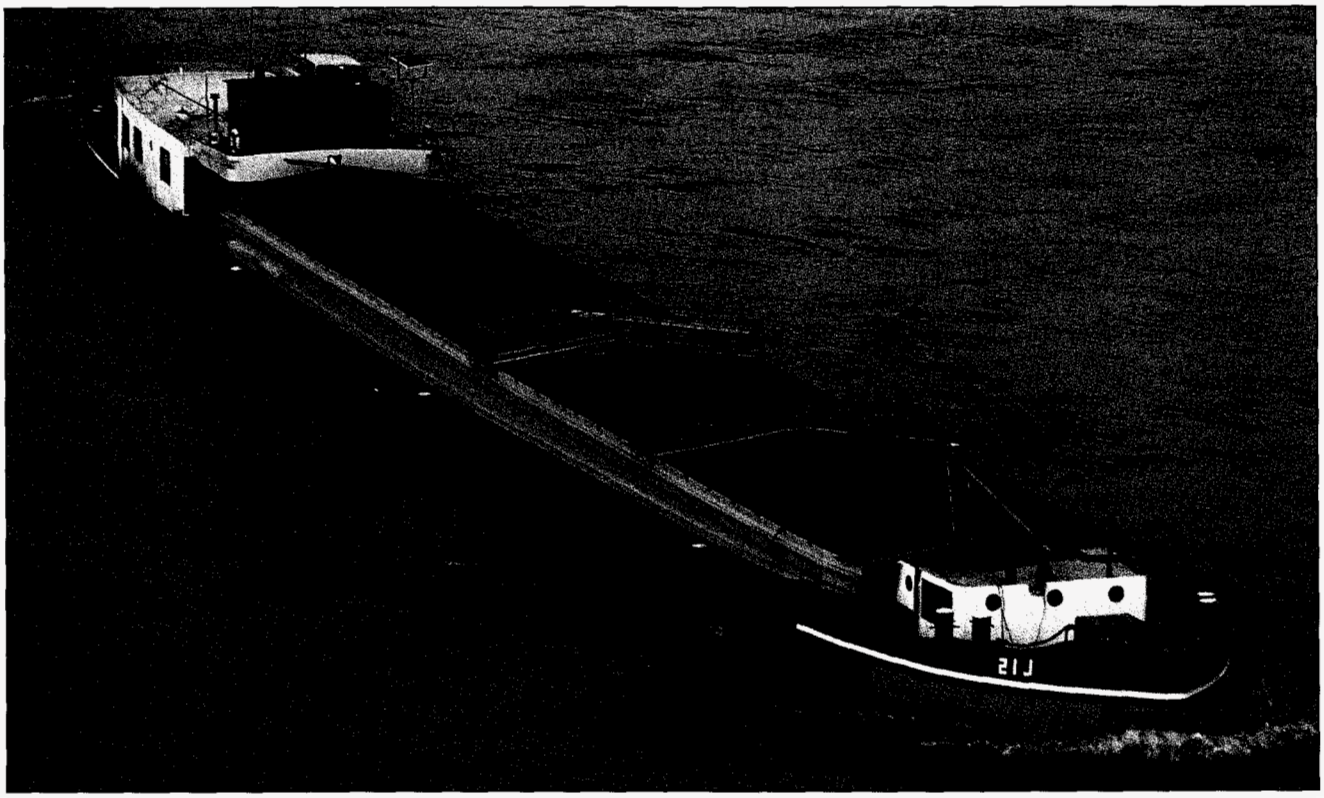
Heat transfer modules weighing four million pounds loaded aboard a deck barge at the Tulsa Port of Catoosa, about to start a river-ocean voyage to a power plant in Montego Bay, Jamaica.

Another major policy direction was formulated in 1996 in the so-called "Community Guidelines" (Decision No. 169/96 EC, JOL 288, 09.09.1996). These guidelines addressed the inadequacy of the links between the various countries' transport networks, as well as missing links and bottlenecks within countries. To achieve an integrated transportation system, the Treaty on European Union has made the Community responsible for helping to introduce and develop Trans-European Networks (TEN) in the transport sector. The aim is to gradually implement the TEN by the year 2010 by integrating the infrastructures for inland, sea and air transport. Specifically, in terms of the IWT, the goal of the TEN program is "to build up a network of consistent, interoperable and economically and ecologically sound inland waterways, on the basis of existing waterways, which will enable them to be used to an optimum extent as a cheap, safe and environmentally friendly mode of transport."

The above referenced White Paper of September 2001 also emphasized the significance of coastal and inland shipping roles in the intermodal transportation system as follows:

"The way to revive short-sea shipping is to build veritable sea motorways within the framework of the master plan for the Trans-European Network. This will require better connections between ports and the rail and inland waterway networks together with improvements in the quality of port services. Certain shipping links will become part of the Trans-European Network, just like roads or railways... To reinforce the position of inland waterway transport, which by nature is intermodal, waterway branches must be established and transshipment facilities must be installed to allow continued service."

To achieve priority for rail and water, the latest E.U. white paper even introduced a concept of regulated competition, stating, "Unless competition between modes is better regulated, it is Utopian to believe we can avoid even greater imbalances,



Dick de Bruin, Ministry of Transport, The Netherlands

The captain and his family often live aboard traditional E.U. self-propelled riverboats like this, with a two-person crew and 750-ton capacity.

with the risk of road haulage enjoying a virtual monopoly for goods transport in the enlarged European Union. The growth in road and air traffic must therefore be brought under control, and other environmentally friendly modes given the means to become competitive alternatives."

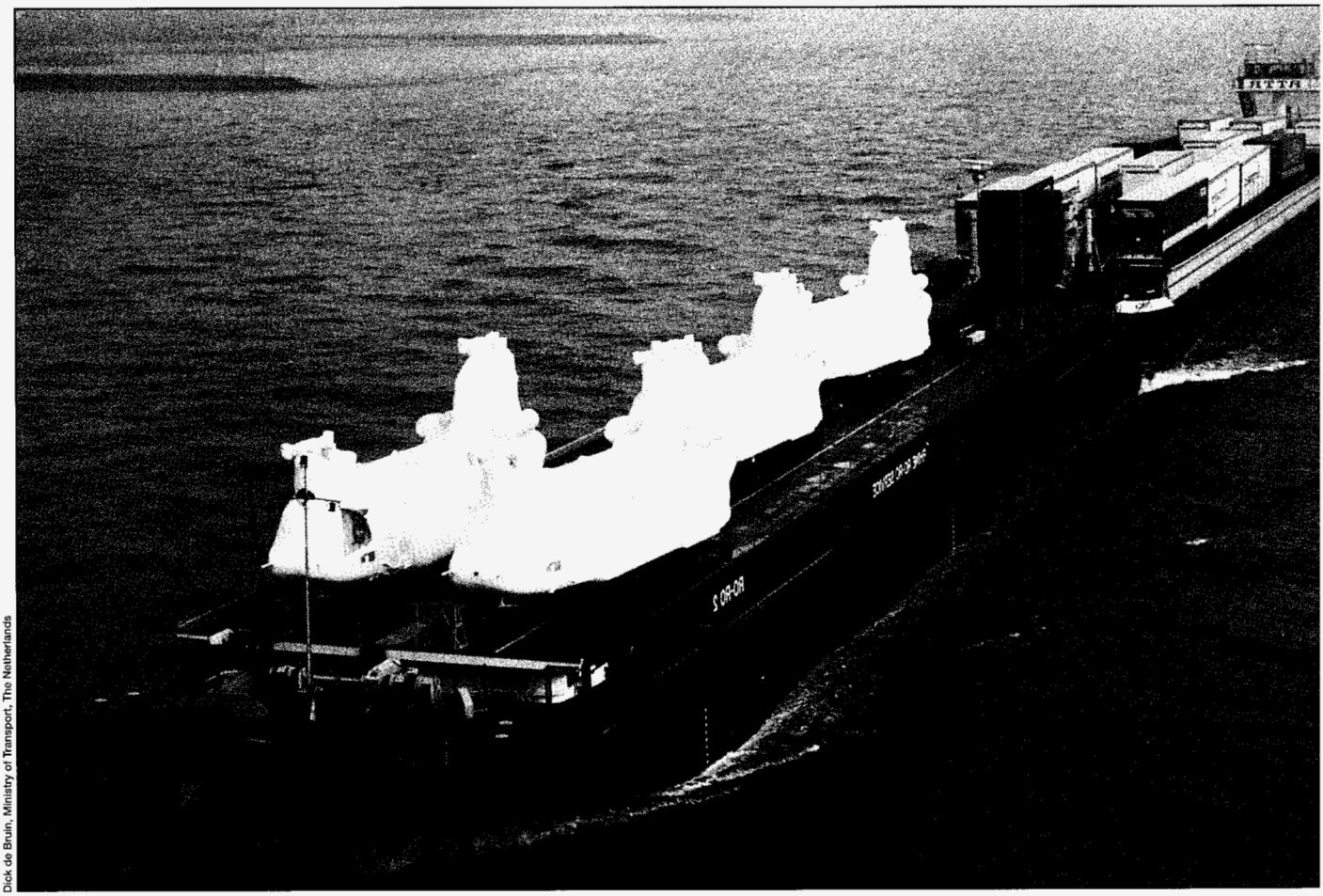
In the U.S., rail transportation of freight, as mentioned above, is much more effective and has twice as high a market share in comparison with the E.U. The growth of traffic on inland waterways, however, is lower in the U.S. in comparison with the E.U. Another important difference is that in the E.U. all policy documents make specific references to the inland waterways' role in the overall intermodal system. These policy directions have obviously assisted European inland waterways in attracting intermodal traffic, including a major role in movement of containers.

Congestion on the road system is a national problem of high priority in most of the E.U. countries, and it is presently considerably worse than in the U.S. There are, however, concentrated efforts in the E.U. to

It is the E.U. policy to expand inland and coastal shipping by implementation of the "sea motorways" initiative within the framework of the master plan for the Trans-European Network program. Inland and coastal waterways comprise a significant part of priority transportation corridors designated under the program.

reduce traffic on roads, while in the U.S. this growth in highway traffic continues unabated. This means that the U.S. will reach the same level of congestion now experienced in Europe within the next five to 10 years.

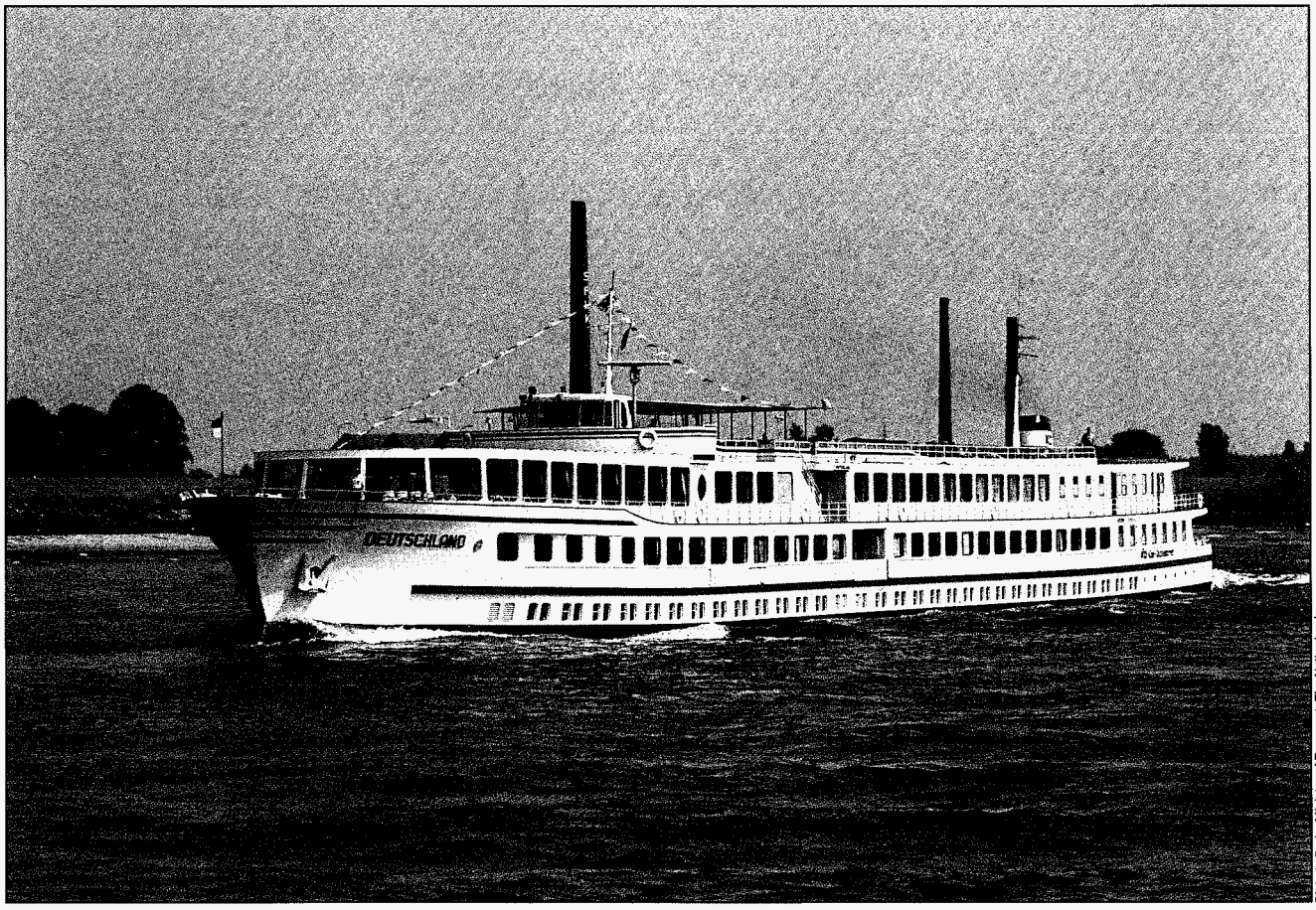
There are no comparable documents in the U.S. that are similar to the original (1992) and latest (2001) E.U. White Papers to steer freight traffic between modes to ease congestion. The most recent U.S. move to address water transportation issues is the so-called "Maritime Transportation System" (MTS) initiative. There is, however, a principal difference between this initiative and the E.U. documents. The MTS objective is to define the water transportation needs and coordinate between different federal agencies having authority over the waterways and with the private industry. The MTS and other policy documents in the U.S. do not provide recommendations regarding prioritization between competing transportation modes or the level of public support necessary to achieve these priorities, while the E.U. documents state very specifically which modes need to be enhanced. Also, these documents clearly give priority to inland waterways and coastal shipping mostly because of their environmental advantages.



Dick de Bruin, Ministry of Transport, The Netherlands

U.S. Army military equipment was transported by Rhine River barges from a base in Germany to Rotterdam during the mobilization just prior to the 1991 war with Iraq.

IV. Environmental Considerations



Dick de Bruin, Ministry of Transport, The Netherlands

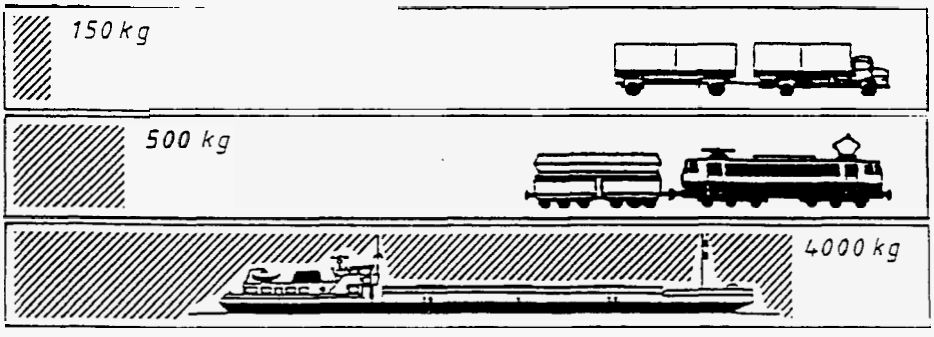
Passenger vessel for tourist operations in the summer seasons on the Rhine, accommodating 150 passengers for regular sailings between North Sea harbors and Switzerland, Germany and France.

European transportation planners and the general public define environmental benefits as the most important factor in the formation of an overall E.U. transportation system. The relative indicators of environmental impacts served as a basis for the above-referenced "Resolution of 14 February 2000 on the Promotion of Intermodality and Intermodal Freight Transport in the European Union" (OJ C 56, 29.02.2000), which reaffirmed the E.U. "determination to promote transport modes contributing to sustainable transport, inland navigation in particular." These "relative indicators" are presented as follows:

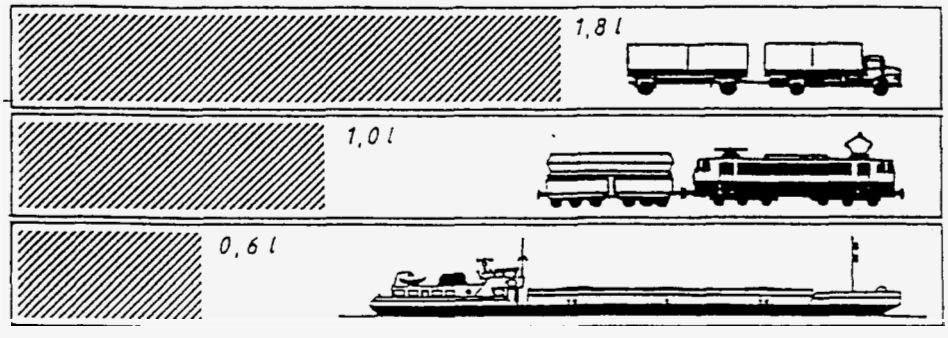
- A mode of transport that is economical in non-renewable energy terms: one litre of fuel can move for one kilometer 50 tons by road, 97 tons by rail and 127 tons by inland waterways.[5]

Comparison of Truck-Railway-Inland Vessels

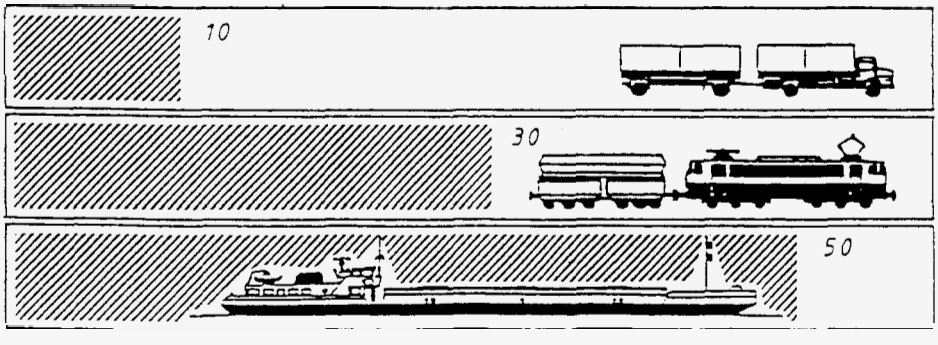
Power in (kg/ 1HP)



Consumption of fuel in (l / t 100 km)



Lifetime in years



urce: Federal Ministry of Transport, Germany

• A very limited environmental impact in socioeconomic terms: an examination of all the external expenditures attributable to the various modes of transport—accidents, air pollution, climatic change, noise pollution, congestion, effects on the countryside and the urban development—reveals that road transport accounts for 91.5% of the expenditure, air transport for 6%, rail transport for 2% and inland navigation for only 0.5%.

Inland waterways serve recreation in a variety of inventive forms.

• Significant impact of lower external costs: the external costs of transport in Western Europe have been estimated to be about 4% of GDP or € (Euro) 260 billion, which include the cost of air pollution, 0.4%, accidents, 1.5%, noise, 0.2% and congestions, 2.0% of GDP.

• Low noise pollution: European Commission evaluation of the external costs in noise pollution for transporting freight within the E.U. by modes (in billions of Euros) produced the following figures: 0 for IWT, €1.168 for rail, and €12.205 for road.

• Waterways as a multipurpose regional entity: it is the unique transport infrastructure that is not only a transport mechanism but is also used in conjunction with water supply, flood protection, hydroelectricity, tourism on waterways, land reclamation (biodiversity, fauna, flora, impacts on the landscape) and the inland waterway's heritage.

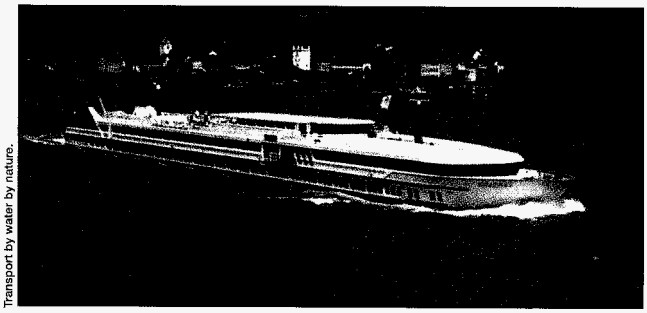
Similar comparative environmental characteristics among transportation modes are typical for the U.S. as well. As far as generally known, however, there are no nationwide integrated indicators of socioeconomic and environmental impacts by modes as presented above for Europe. This does not mean that they cannot be derived. Professional literature contains methodological approaches to quantify these impacts, if not with

An examination of all the external expenditures reveals that road transport accounts for 91.5%, air for 6%, rail for 2% and water for only 0.5%.

full precision then sufficient enough to illustrate their order of magnitude. Most recently the National Ports and Waterways Institute, University of New Orleans, developed a methodology for assessment of intermodal projects.[6] Incorporating environmental impacts and other external aspects of transportation into the matrix of benefits and costs was the most critical aspect of this methodology. The major categories of external costs included are air pollution, noise, congestion, and accidents caused by transport activities. To achieve better accuracy in the complex evaluation, the external impacts were evaluated not at a generalized level but site specific. For example, the magnitude of air pollution damage depends not only on the amount of emission, but also on the locality of pollution and the degree of exposure to flora, fauna, and humans.

Anne Roth, Voies Navigables de France

Recreational house boat, France

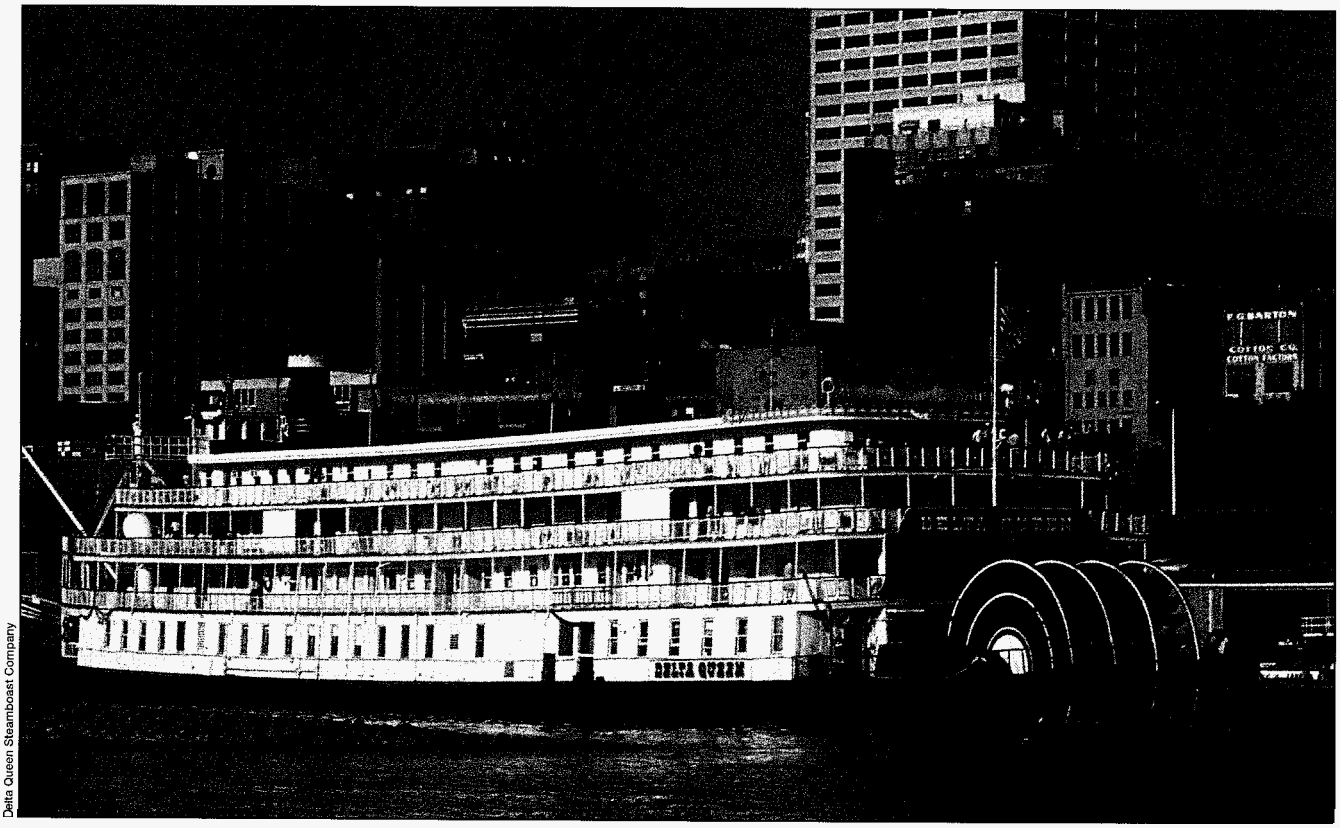


Transport by water by nature.

One day tourist cruise in Germany.

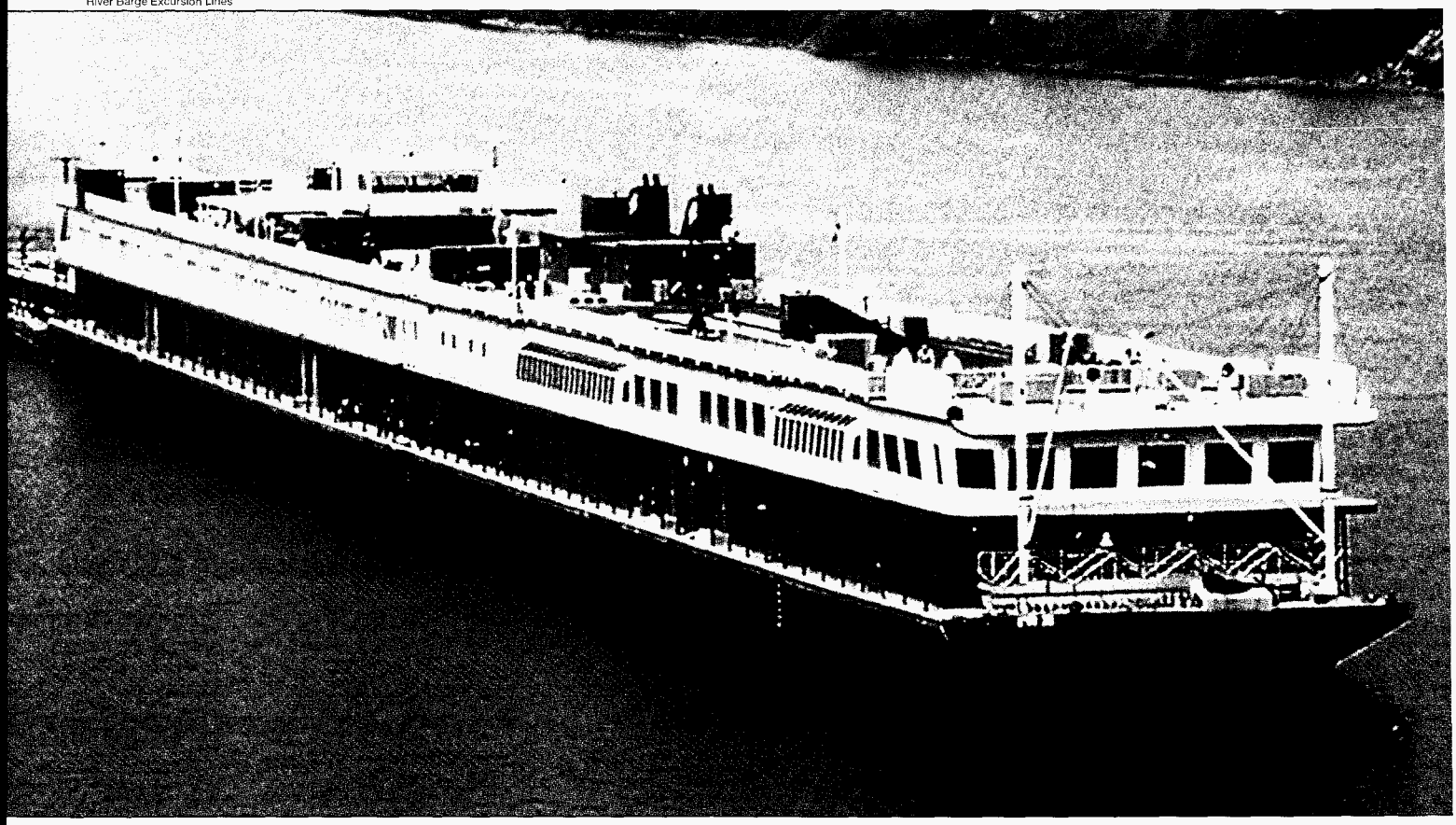
The methodology was illustrated

The historic Delta Queen is one of several steamboats providing luxurious cruises on the Mississippi River waterway system.



Delta Queen Steamboast Company

River Barge Excursion Lines



Hotel-barge operated by River Barge Excursion Lines of New Orleans plies America's midcontinent river system The 198-guest "River Explorer" is pushed by a towboat.

by actual intermodal projects. One of these examples is the movement of 400,000 tons of wood chips from Natchitoches Parish Port on the Red River Waterway to Port Hudson, Louisiana, on the Mississippi River. The wood-chip producer has a choice of shipping them by barge (with short delivery by truck) or by truck to a paper mill at Port Hudson. The proposed project is to construct a concrete bulkhead for mooring barges that are loading wood chips. The results of the evaluation are presented in Figure 2. There are two apparent conclusions: first, the total social cost of the barge option is less than 10% of the trucking option, and, second, the social cost differential is significant and, if taken into account, doubles the total savings.

The IWT environmental advantages are not only determine formulation of an overall transportation policy in the E.U., but are also reflected in the specific regulations and public financing of waterway-related projects. The basic principle adopted by the E.U. and member countries is to evaluate costs related to environmental impacts by modes of transportation and to support a general policy or a specific project which represents a "less

For a typical project, comparing water and truck transportation options, inclusion of environmental and other social cost differentials may double the waterway cost advantage.

environmentally damaging alternative" (communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions – the Common Transport Policy – Action Program 1995-2000, COM/95/302 Final, 12.07.1995). The E.U., in fact, has established a variety of programs directing that the IWT receive credit for environmental benefits resulting from traffic being shifted from other modes. For example, if a waterway improvement diverts traffic from road to water, the project receives additional public financing somewhat equal to the savings in environmental impact.

"The E.U. has established a variety of programs for water transportation to receive credits for environmental and other social benefits, resulting in traffic diversion from land transportation to water."

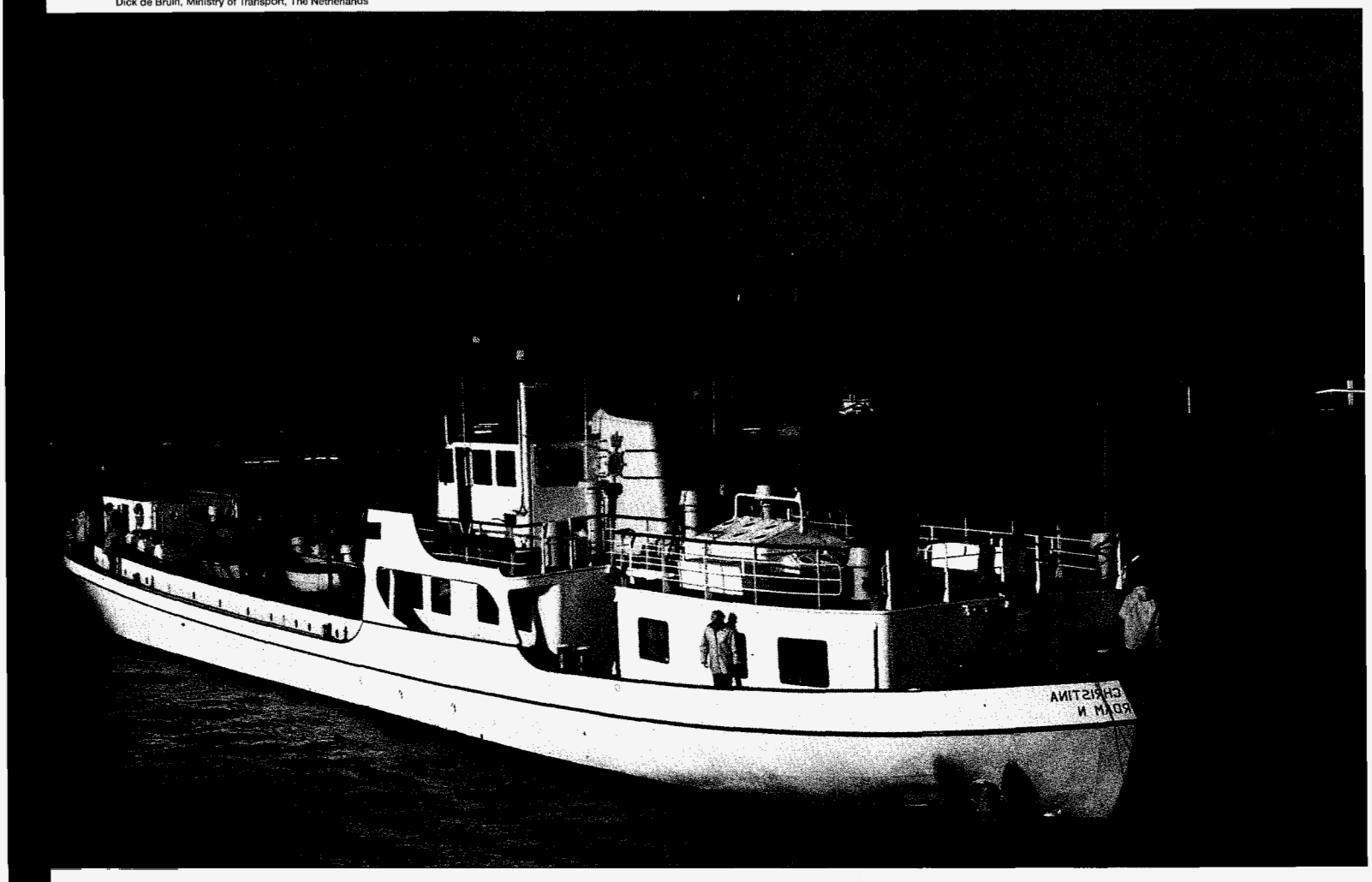
In contrast, there is no similar mechanism in the U.S. to reward a less environmentally damaging water transportation project by attributing to it a reduction in environmental and other social costs as a benefit. To the contrary, the environmental impact is most often assessed as an absolute without regard to consequences for other modes. An example of this approach is a recent report addressing expansion of navigation locks on the Upper Mississippi

Figure 2. Annual Social and Private Costs of Intermodal Alternatives for Transporting Wood Chips from Natchitoches to Hudson, Louisiana.

Alternative >	Truck	Barge/Truck
Air pollution	$203,000	$48,000
Congestion	71,094	N.A.
Noise	68,200	N.A.
Accident	275,400	9,098
Subtotal social costs	617,694	57,098
Private costs	4,033,890	3,473,274
Total costs	$4,651,584	$3,530,372
Private savings	$560,616	
Social savings	$560,596	
Total savings	$1,121,212	

N.A. = Not Applicable or not estimated
Source: National Ports and Waterways Institute, University of New Orleans

Dick de Bruin, Ministry of Transport, The Netherlands



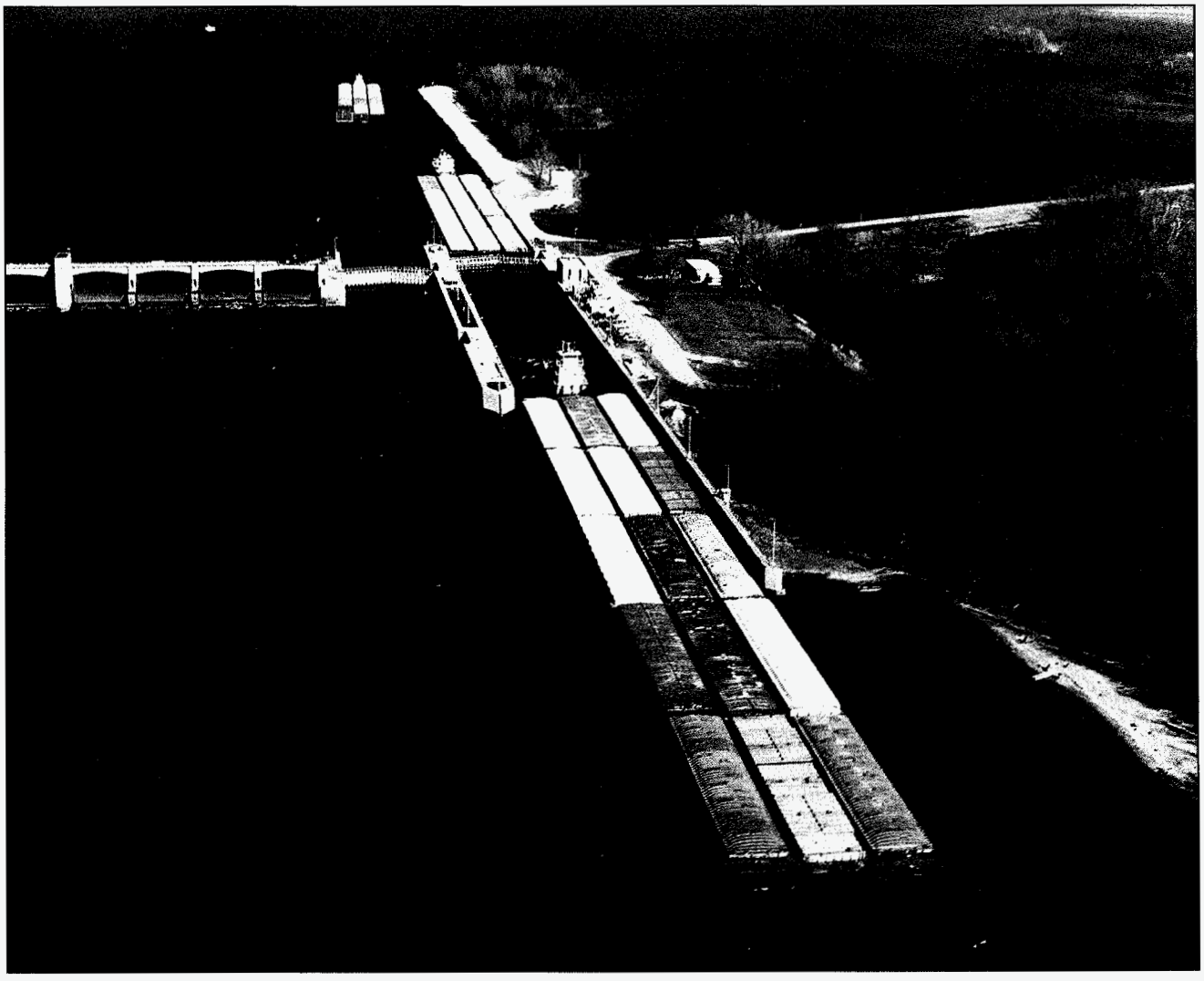
"In the U.S. there is no mechanism to reward environmentally friendly transportation modes for reduction in their external, environmental and social costs. It is important to take into account external costs in comparing transportation projects and establishing user charges."

waterway system, prepared by a distinguished panel of prominent experts.[7] The prestige of this report will certainly influence the planning of future waterway improvements. This document outlines the most comprehensive requirements for environmental assessments of waterways projects. In accordance with these requirements, even minor and sometimes practically impossible-to-detect navigation impacts have to be analyzed in depth. To meet this report's recommendations, waterway projects will have to be the subject of extensive and prolonged field and laboratory measurements, to an extent that makes their implementation

Continued on page 32

E.U. countries have established programs to educate the younger generation on the commercial and environmental advantages of water transportation. The U.K. has launched an initiative to "help children be good for the canals," and the Dutch goverment finances training schools on shore and on vessels. Shown is one of four training ships for school children in the Netherlands.

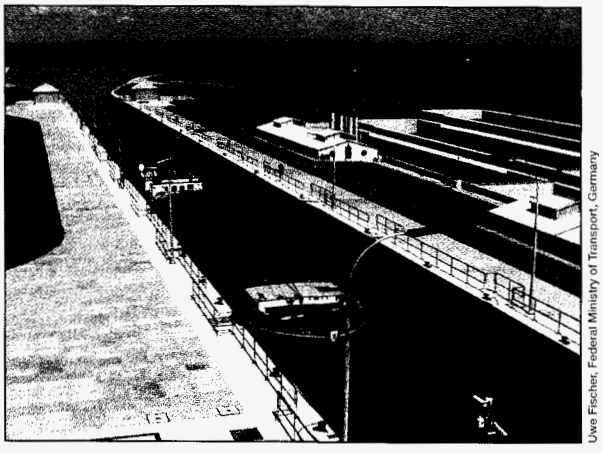
U.S. farmers may lose competitive edge if Upper Mississippi/Illinois Waterways are not modernized.



Some of the navigation locks on the Upper Mississippi and Illinois Rivers, built in the 1930s, require repair and modernization. They are also too small to accommodate 15-barge tows commonly used on the systems, as shown in this photograph of Upper Mississippi Lock and Dam 13. The Upper Mississippi and Illinois Rivers are prime corridors for moving corn and soybeans to Gulf Coast seaports for export to overseas markets. Failure to modernize and expand these locks will severely limit inland water transportation in the U.S.

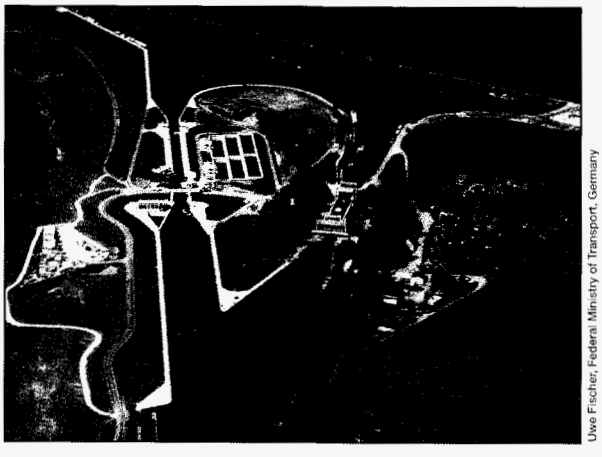
European navigation infrastructure represents great variety of engineering solutions.

European waterways are innovative in the use of vertical or inclined ship-lifts, aqueducts, water-saving basins, etc. Such technologies work in part because E.U. vessels are generally smaller in size and weight than those in the U.S.



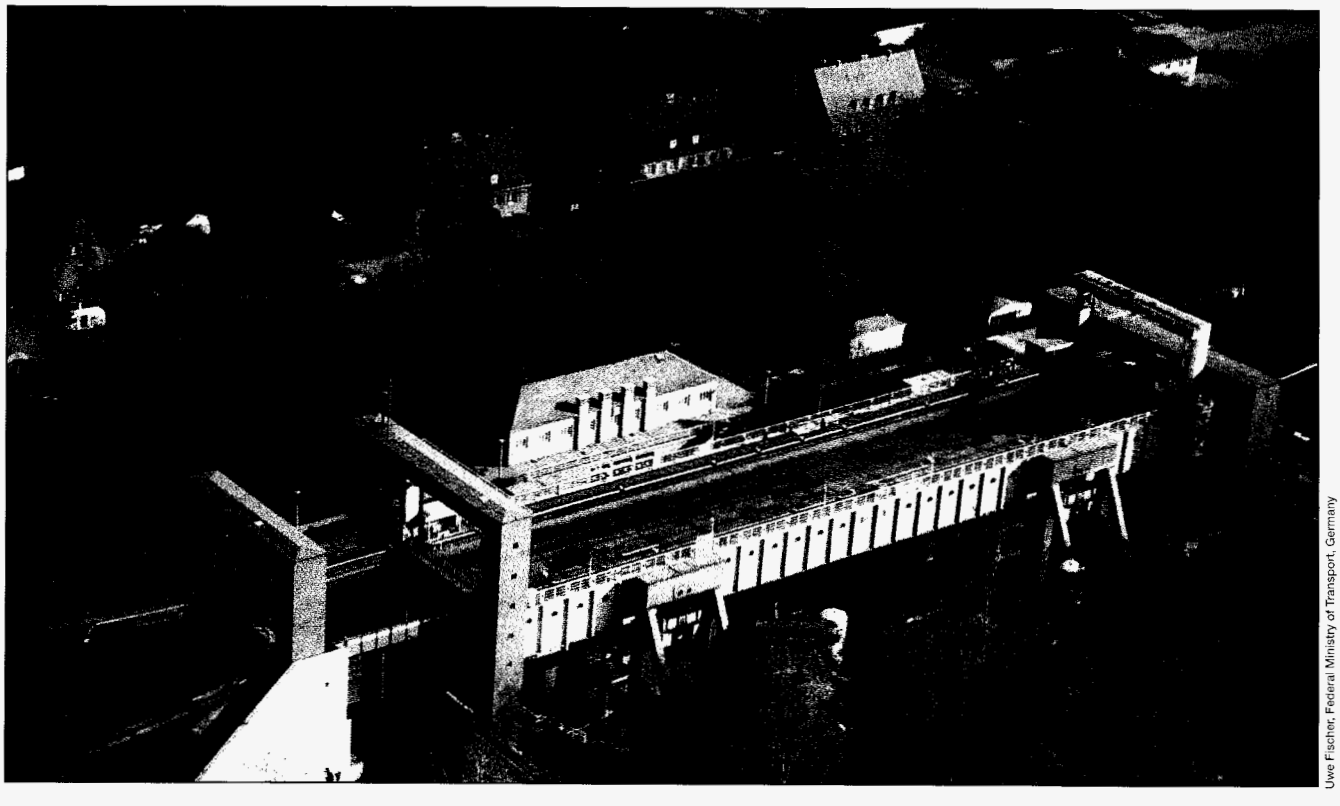
Uwe Fischer, Federal Ministry of Transport, Germany

Volkerak navigation locks with triple parallel chambers each 250 meters long and 25 meters wide on the waterway connecting Rotterdam and Antwerp. The waterway includes tidal, river and canal segments.



Uwe Fischer, Federal Ministry of Transport, Germany

Shown on the right and below, Magdebur navigation lock combined with a ship lift for passage of recreational and other smaller craft, Germany.

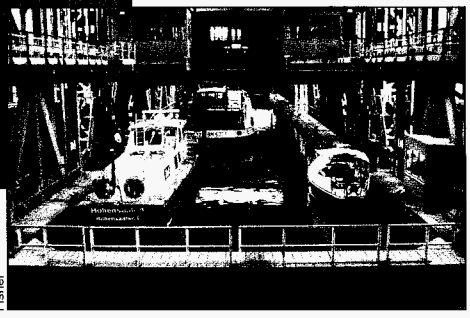


Uwe Fischer, Federal Ministry of Transport, Germany

Continued from page 29

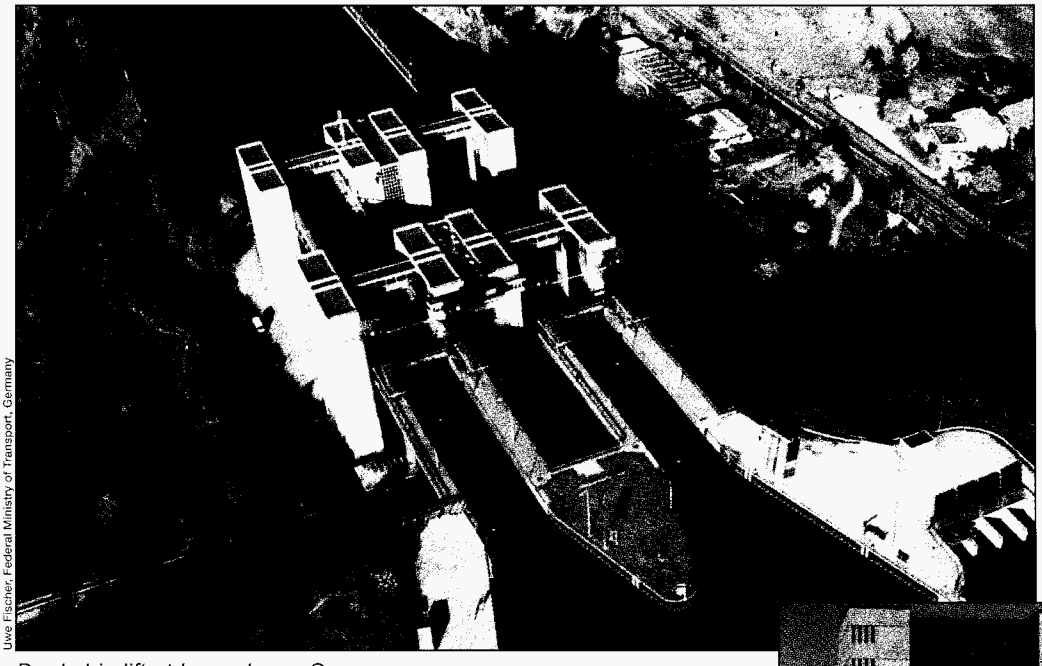
challenging, if possible at all. It is, after all, exceedingly difficult to quantify something that hardly exists. The same document makes, however, practically no reference to potential environmental impacts by other modes of transportation, which would have to accommodate additional traffic in the absence of waterway improvements.

Uwe Fischer, Federal Ministry of Transport, Germany



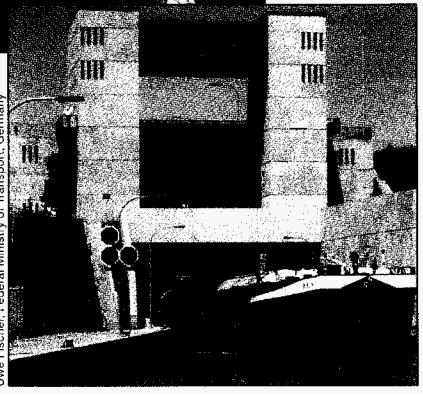
Fisher

Vertical ship lift at Niederfinow, Germany.



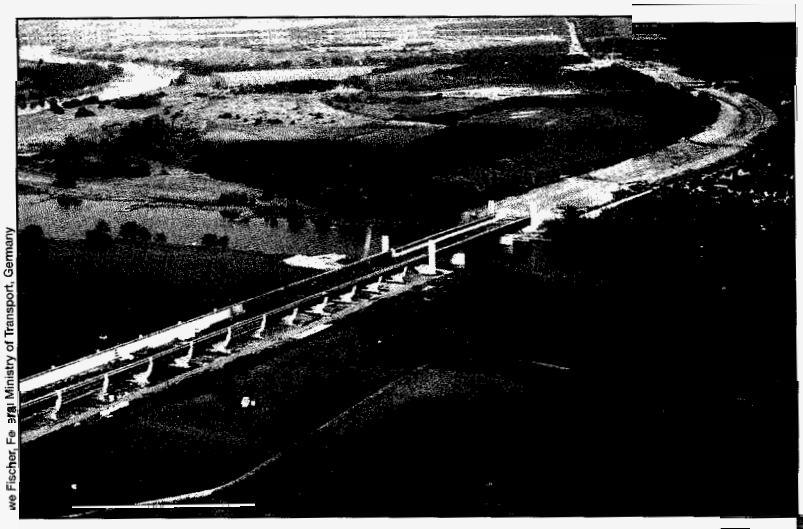
Uwe Fischer, Federal Ministry of Transport, Germany

Dual ship lift at Lueneburg, Germany



Uwe Fischer, Federal Ministry of Transport, Germany

Navigation lock on the Rhine-Main-Danube Canal

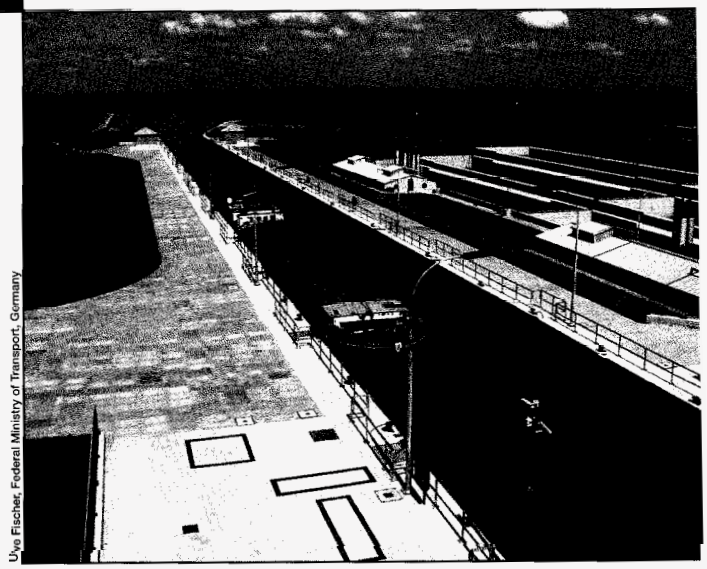


Uwe Fischer, Federal Ministry of Transport, Germany

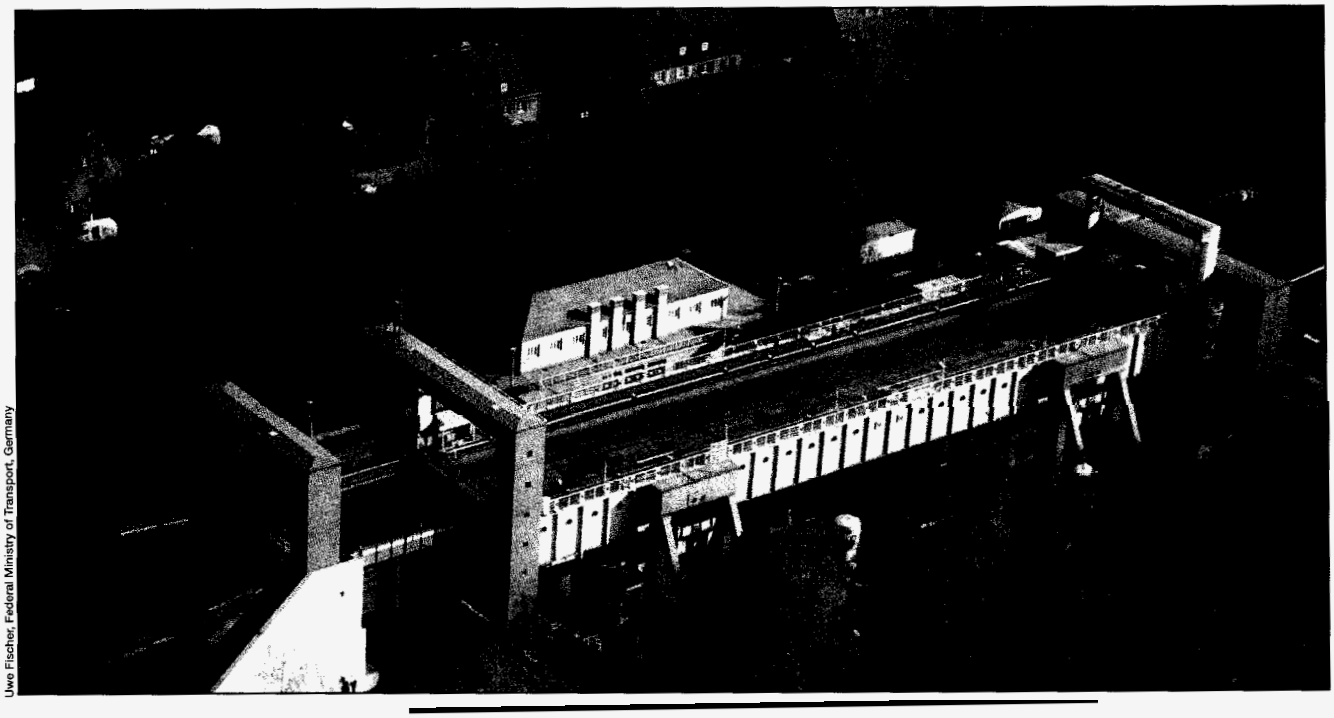
A new canal bridge in Germany eliminates a troublesome bottleneck on the Hannover-Berlin waterway corridor.

Using the newly completed canal bridge over the Elbe River (shown under construction at top left), barges traveling between Hannover and Berlin now have a direct connection between the Mittelland Canal and the Elbe-Havel Canal. Previously, barge traffic in the direction of Berlin had to descent to the Elbe by way of the Rothensee ship lift (below), proceed down the Elbe to the Niegripp Lock and then descent into the Elbe-Havel Canal. Fluctuating water levels on the Elbe frequently impaired the movement of goods.

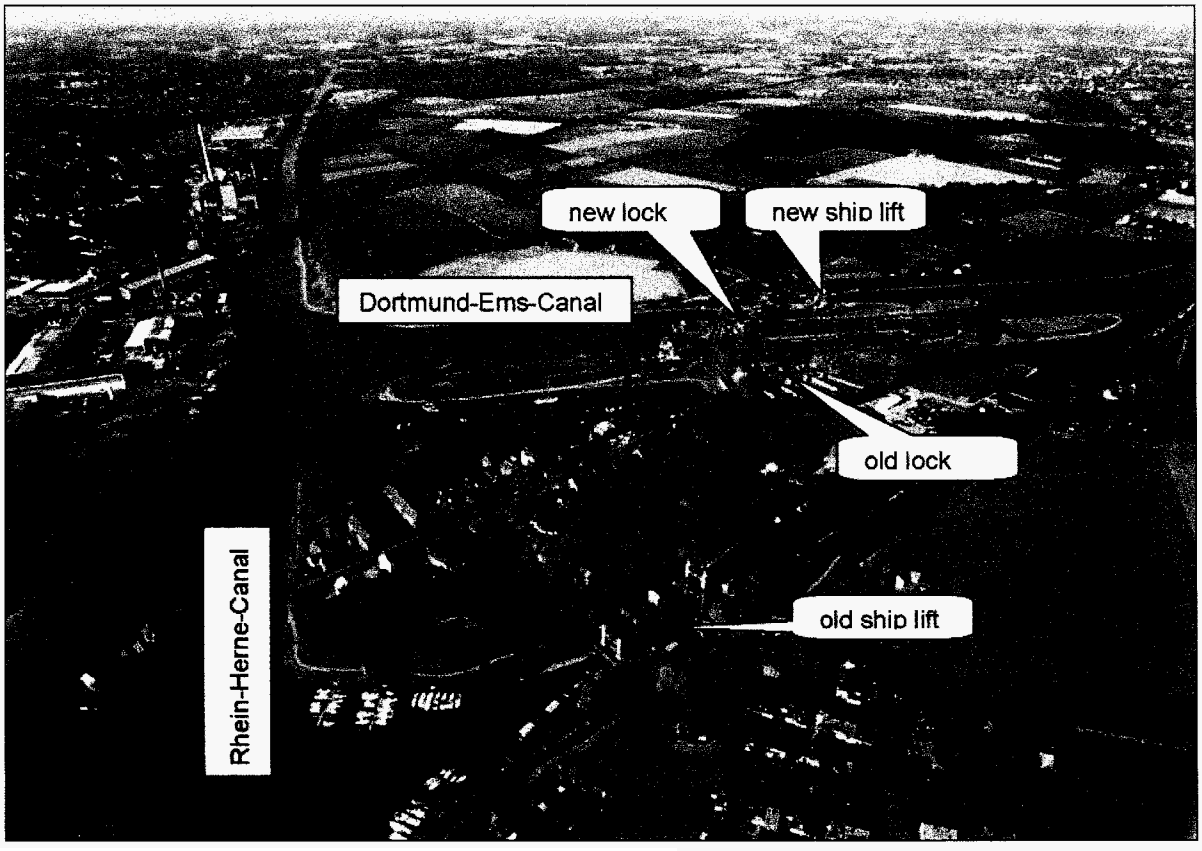
Another new navigation facility in the same vicinity is the new Rothensee Lock (right), which has three rows of water-saving basins arranged alongside the lock. Both the "Magdeburg waterway cross," as the canal bridge is known, and Rothensee Lock were placed into operation in 2003.



Uwe Fischer, Federal Ministry of Transport, Germany



Uwe Fischer, Federal Ministry of Transport, Germany



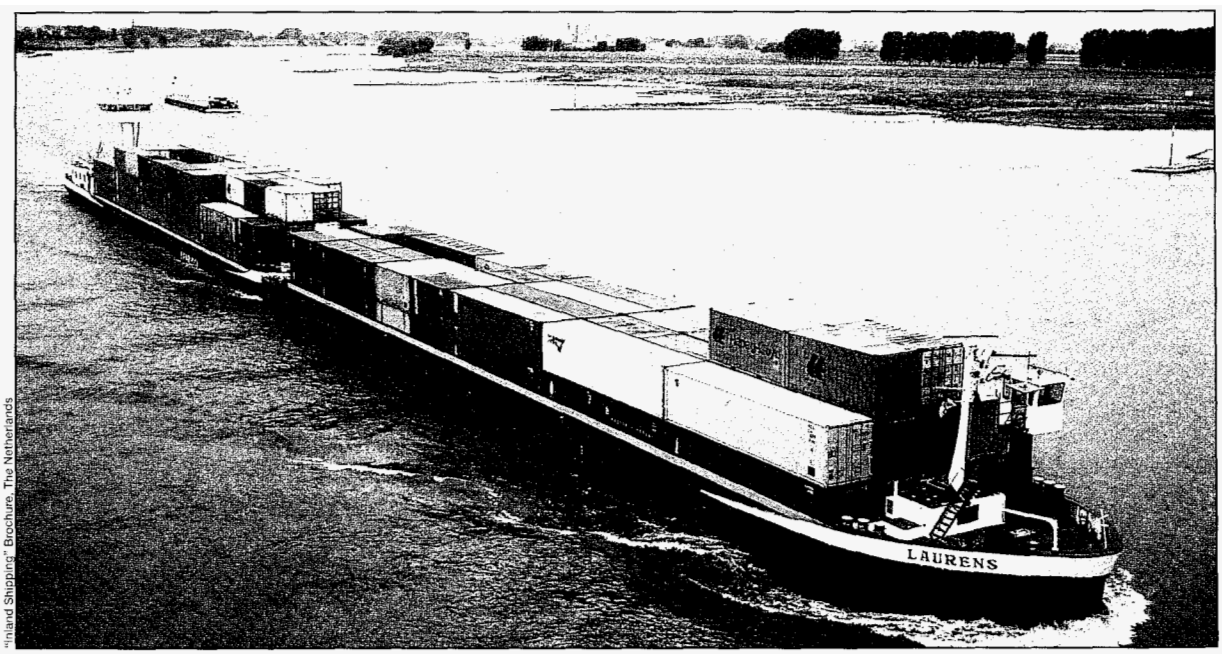
System of old and new structures at "Magdeburg Water Cross."

V. Policy Implementation

The overall E.U. policy of expanding the inland waterways and coastal shipping role in the transportation system is implemented by a variety of methods, such as the liberalization of regulations, modification of competitive setting, integration in the intermodal corridors and direct financial assistance.

• *Deregulation.* One of the barriers for the competitive operation of IWT in Europe until recently was a policy of chartering by rotation. That is, a vessel operator was employed not as a result of competitive pricing and performance but in accordance with his place in line. This practice began after World War II and is judged a major reason for the decline of the inland waterways' market share from 12% in 1970 to 7% currently.

The European Council addressed this issue in 1996 (Council Directive 96/75/EC of November 19, 1996, on "The System of Chartering and Pricing in National Inland Waterway Transport in the Community"). The new deregulation gradually eliminates this practice and allows customers to choose their transport operators from anywhere in the European Union and freely negotiate the price. Thus,



"Inland Shipping" Brochure, The Netherlands

Container traffic is growing by leaps and bounds on European waterways as national governments try to deal with paralyzing traffic congestion on their highways and streets. As a result, governmental policies encourage shippers to utilize water and rail as more environmentally friendly, safer and less intrusive.

The objective of already implemented and expected substantial increases in highway user charges in the E.U. is to shift traffic to more environmentally advantageous modes of transportation, such as waterways.

a major barrier to competition has been removed with the objective of increasing the waterways' efficiency.

• *Vessel scrapping and modernization program.* The other barrier to inland waterways transport in Europe had been its chronic fleet overcapacity. Public funds were allocated for a vessel-scrapping initiative (Council Regulation 2254/96/EC of November 19, 1996). This scrapping program, with total cost €129 million, was coordinated at the E.U. level and financed by the industry and the member states. The aim was, again, to make the industry more competitive by improving its structure and productivity, and allowing some operators to go out of business with an acceptable level of financial compensation.

In addition, existing vessels can have their engines modernized or replaced with the help of the various forms of public aid dedicated to restructuring and technical efficiency. This program was provided by Council Resolution 718/99. As a result, the number of vessels has dropped by about 4,000 units, and a 25% reduction in the pollution level has been achieved. The initiative is considered so beneficial that the E.U. is currently evaluating a proposal to broaden the programs and grant subsidies for the purchase of new engines.

• *Road user charges.* Parallel with deregulating and modernizing inland waterway transportation, its competitive position is being enhanced by higher road user charges, reflecting full costs for truck operation. By the end of 2003, the E.U. and the member states intend to replace the existing system of time-based highway user charges for trucks to distance-based user charges. Moreover, these charges also will include emission and other external costs.[8]

The objective of expected substantial increases in highway user charges is to shift traffic to more environmentally friendly modes of transportation, such as waterways.

According to the German road haulage association (BGL), with that country's new motorway tax, effective on August 31, 2003, the cost of trucking will increase by 12% to 15%.

A tractor unit, moving an annual average of 100,000 km on German motorways, will incur additional costs in the range of $17,000.[9] This should dramatically reshape the way cargo moves in and around Germany. To assist shippers, the intra-European short-sea operators are offering additional intermodal rail and barge

services to and from Rotterdam. As already mentioned, there are practically no user charges on the European inland waterways.

Along with an increase in road user charges, other measures are being undertaken to improve working conditions for truck drivers and overall road safety. Since highway accidents in the E.U. cause about 40,000 fatalities per year, these measures include strict control over drivers' work hours, a universal weekend ban on trucks, higher requirements for issuing driver certificates, and tighter traffic controls and penalties.

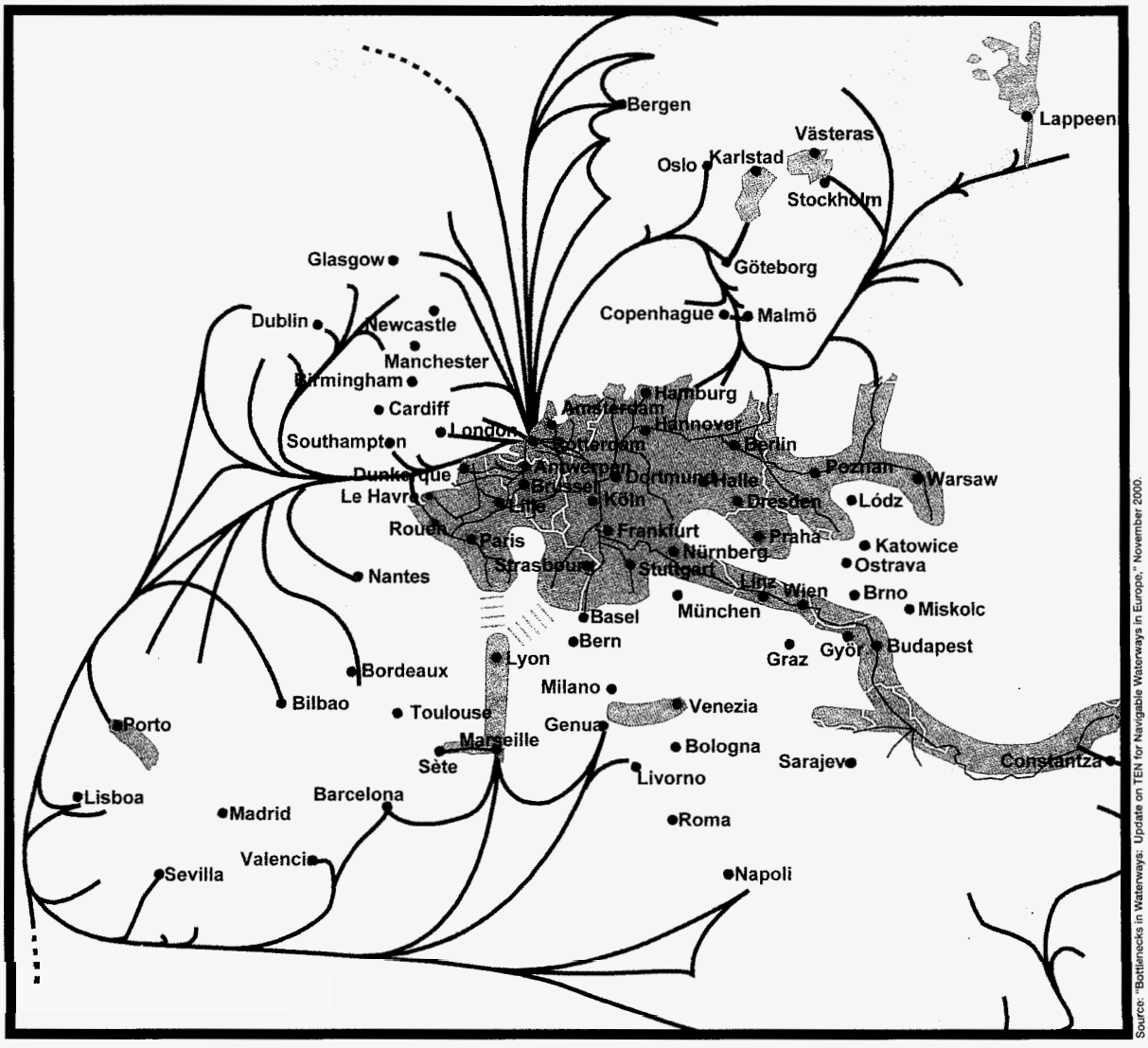
It is specifically important to take into account external (environmental and social) costs in comparing transportation projects and establishing amounts of user charges by transportation modes. As shown above, the external costs are substantial and their inclusion in transportation planning and actual modal competition may be a major factor in formation of transportation systems. Active debate is currently underway in the E.U. regarding methods for assessing and charging for external costs.[10] There is little doubt, however, that in one or another form the external costs will be included. This will substantially increase transportation costs by road and rail, but not by water, where such costs are considered by the E.U. as being close to zero.[11]

In many cases, taking external costs into account will produce more revenues in excess of the costs of the infrastructure used. To produce maximum benefit for the transport sector, it is essential, in the view of European planners, that available revenues, regardless from whom collected, be channeled into specific funds to reduce external costs. That will give priority to building an infrastructure which has the least environmental impact, such as water transportation.[12]

• *PACT program.* In addition to public assistance in the liberalization and modernization of inland waterways, the E.U. and member states provide a variety of financial assistance programs for their future expansion as a preferable mode of transportation. One of these programs is the PACT (Pilot Actions for Combined Transport) program. This program was established in accordance with European Council Resolution #2196/98 to grant financial assistance for innovative actions to promote combined (intermodal) transport. Operators wishing to launch innovative projects that are adapted to market requirements may

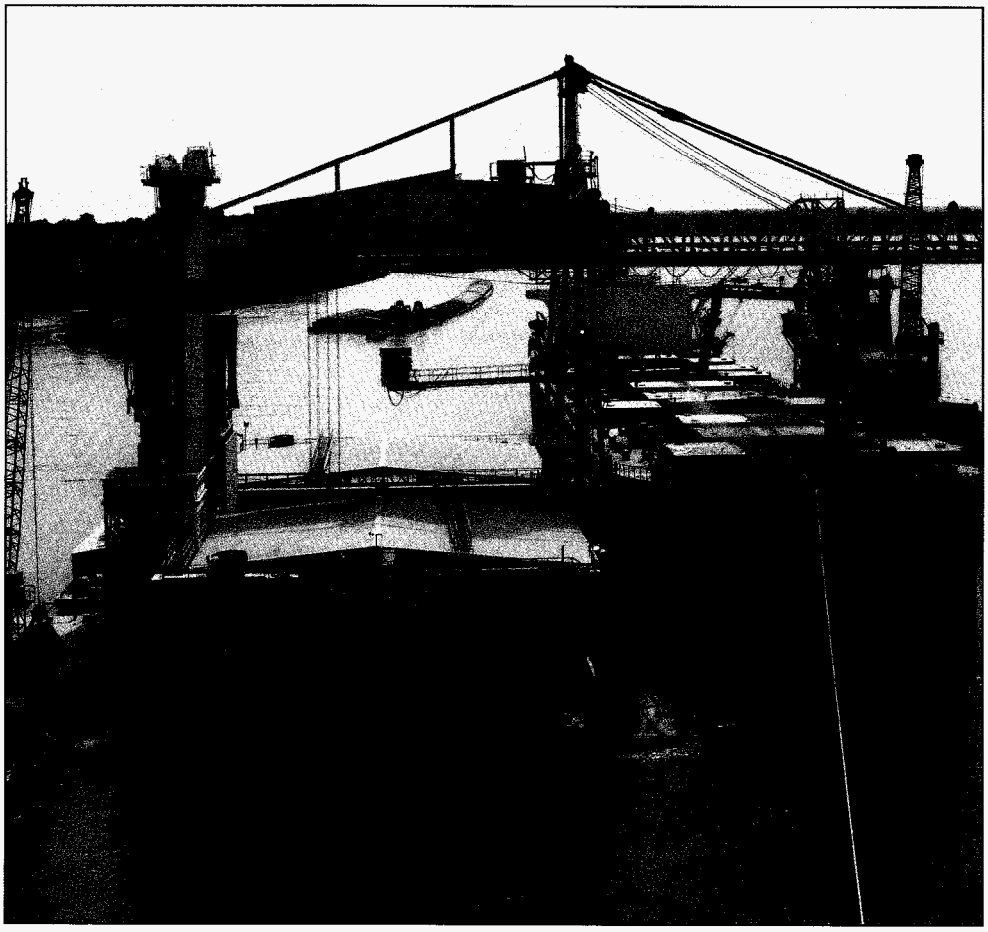
"The E.U. member states are encouraged to grant aid for investments in the waterway port terminals or construction of rail or road segments, if they are connecting to these terminals and result in attracting more freight to water."

Europe Intermodal Via Water, 2000



European coastal and inland waterways are connected to the main industrial areas in Austria, Belgium, France, Germany, Hungary, Luxemburg, the Netherlands, Poland, Scandinavia and Switzerland as well as the U.K.

Linking inland waterways transportation with coastal and ocean routes at estuarial ports provides for efficient transshipment of cargoes.



Cooper/Consolidated

In the middle of the Lower Mississippi River, the world's largest floating grain elevator, "America," transfers soybean meal from river barges to a waiting ship.

receive financial support under the PACT program, covering operational expenditures up to 30% of their cost and feasibility studies up to 50% of cost. The objective is again to increase competitiveness of more environmentally friendly modes of transportation, such as waterways, and support introduction of new technology and innovative operational methods. Examples of successful projects which have been funded by the PACT program include:

- A barge service between Lille and Rotterdam, taking about 50 trucks per day from roadways in a heavily used corridor.
- Rail-barge service between Novara, Italy, and the Rhine ports.
- Coaster (river-sea) service between Zeebrugge, Belgium, and Duisburg, Germany.
- A new combined rail/sea link between Sweden and Italy via

Cooper/Consolidated

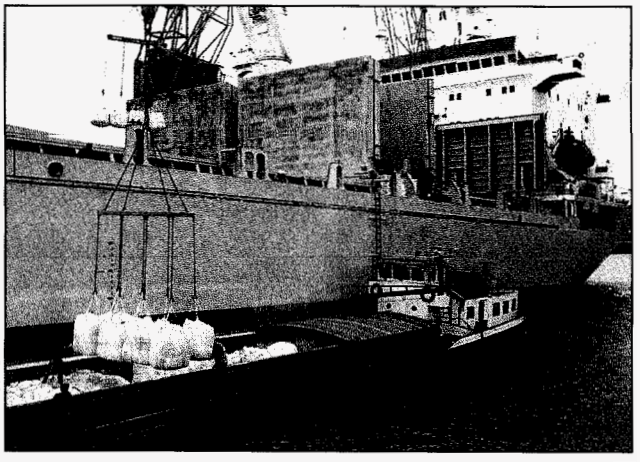
Between Baton Rouge and New Orleans on the Lower Mississippi River, two floating cranes discharge steel slabs from a ship to waiting barges as a workboat shifts a loaded barge into a nearby fleeting area.

Germany and Austria. This service takes some 500,000 tons a year off the busy roads and reduces delivery time by two days.

• A shipping service between La Rochelle–Le Havre and Rotterdam.

After the PACT program ended in December 2001, the Commission announced plans to replace it with a new and expanded program, called "Marco Polo." The objective of this new program is similar—to shift freight to more environmentally benign modes such as short-sea and inland waterways, and to support these alternatives to land transportation in the early stages until they become commercially viable.

• *Investments in waterway infrastructure by the member states.* The E.U. member states are encouraged to grant aid for investment in the infrastructure of inland waterway terminals or the fixed and mobile equipment needed for attracting waterways freight.[13] Member states allow subsidies of up to 50% of the related capital costs. Waterway operators are required to provide intermodality and contribute to better connections between navigation channels and land modes of transportation. For instance, under this provision a financial subsidy can be given not only directly for expansion of a river terminal, but



"Inland Shipping" Brochure, The Netherlands

Inland and ocean vessels transfer cargo in European coastal ports.

In the E.U. river barges are moving more cargo directly from arriving ships to inland destinations (as shown above and below), avoiding congested highways and urban areas. At right, container coastal and inland ships come in all sizes, depending on routes and volumes, waterway dimensions, and lock sizes.

"Inland Shipping" Brochure, The Neth- and

Dick de Bruin, Ministry of Transport, The Netherlands

Trans-European Network (TEN) program serves as a main focus in the formation of major transportation corridors in Europe. The projects identified as a part of TEN are receiving priority in financing and implementation.

also for construction of rail or road segments if they are connected to a waterway.

• *Inland waterway freight grants in the U.K.* A typical example of financial aid for expansion of water transportation by the Member States is the recently established "Freight Facilities Grant" (FFG) in the UK.[14] This program is based on the premise that "taking freight off congested roads and moving it by inland waterways can have environmental and wider social benefits but it can be more expensive. FFG is therefore available to help meet the extra costs generally associated with moving freight by inland waterway and offset the capital costs of providing inland waterway freight handling facilities." It is remarkable that this program was initiated in the U.K. where inland waterways have relatively small dimensions and high costs of operations. In comparison to U.S. waterways, water transport costs in the U.K. are 10-15 times higher.

For the purpose of FFG, a special unit was established at the Department of the Environment, Transport and the Regions (DETR). The focus of FFG is public benefits, both environmental and social, arising from freight being moved by inland waterway rather than by road. Grant amounts can be equal to the value of the environmental benefits, determined by a financial appraisal of the project, comparing the inland waterway with the road alternative. The benefits are calculated by taking the tonnage committed to an inland waterway over an agreed number of years (a commitment to operate a facility for this period is needed), and by estimating how many truck-miles this will save. Then, benefits are assessed simply by multiplying saved truck miles by a so-called "road value," reflecting environmental costs. These per truck-mile costs vary from about $2 for rural roads to $0.40 for highways.

• *Trans-European Network (TEN) program.* It was mentioned earlier that this program serves as a main focus in the formation of major transportation corridors in Europe. The projects identified as a part of TEN are receiving priority in financing and implementation. The Essen European Council in 1996 adopted 14 corridors under the TEN program. A number of large-scale projects have

Uwe Fischer, Federal Ministry of Transport, Germany

Berlin's waterways, like those of most of Western Europe, are often clogged with ice during the winter months. On the major rivers and canals, however, navigation continues most of the year. In the U.S., thick ice usually closes most of the Upper Mississippi and Missouri Rivers from late December until mid-March.

already been completed, and six or so new projects are expected to be added. Inland waterways comprise a significant part of the TEN corridors, including the Rhine axis; the North-South axis, linking the Netherlands, Belgium and France; and the East-West axis linking Northern Germany with the Belgium and Dutch ports to the west and the Elbe and Oder Rivers to the East. The South-East axis consists mainly of the Danube River. In 150,000 km length of transportation routes designated as TEN, close to 20,000 km, or 12%, are inland waterways.

The majority of financing for TEN development is included in the respective national budgets of the individual states of the E.U. Encouragement is also given to the

Anatoly Hochstein, Ph.D., National Ports and Waterways Institute

The self-propelled riverboat Berlin leaving a lock on the network of shallow-draft waterways in and around the German capital. Waterways connect Berlin with the Oder River to the east and north and the Elbe to the south and west, providing direct links to the North and Black Seas.

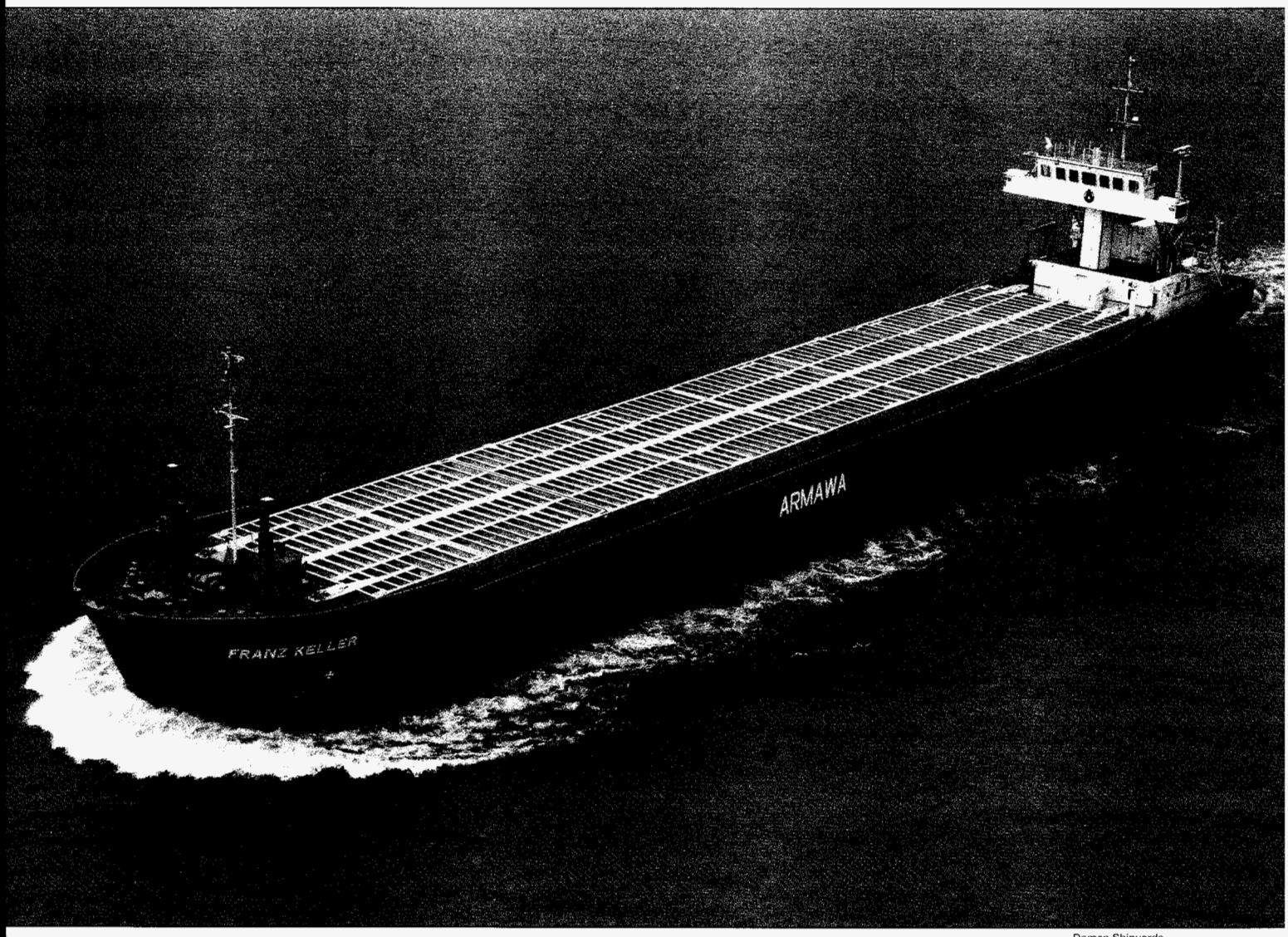
use of private equity contributions through concession and partnership arrangements. Given the limitations of the national budgets and possibilities of public/private partnerships, innovative solutions based on the pooling of the revenues from infrastructure charges are proposed. The E.C. rules are expected to be amended to open up the possibility of allocating part of the overall revenues from transportation user charges (mostly roads) for the most environmentally advantageous infrastructure, such as for expansion of water transportation. The TEN system is also complemented by the so-called Pan-European Transport corridors, which connect the TEN with countries of Central and Eastern Europe known as "Helsinki corridors." The E.U. provides financial aid for implementation of these corridors, estimated at about $2.5 billion. The waterways represent close to 8% of the total length of the Pan-European corridors.

The prominent role of waterways in the TEN program is significant, because it provides substantial resources for improvements and because it further integrates waterways into intermodal operations. The European TEN concept might be compared with the Transportation Efficiency Act of the 21st Century or TEA-21 in the U.S., which also was intended to assist in the formation of an intermodal system. The principal difference, however, is that TEA-21 included few provisions related in any way to inland waterways. As mentioned above, inland water transportation in the U.S., unlike in Western Europe, remains the only mode with essentially no participation in the national framework of intermodal operations.

"The sea motorways concept includes combining sea routes between the E.U. countries, or so-called short-sea shipping, with inland waterways as an integral part of the overall system. Short-sea shipping carries about 40% of the freight within the E.U., with a growth rate nearly as high as for roads."

• *Sea motorways.* Linking sea, inland waterways and rail.[15] In 2004, the E.C. will present a more extensive review of the TEN aimed in particular at introducing the concept of "sea motorways." The sea motorways concept includes combining sea routes between the E.U. countries, or so-called short-sea shipping, with inland waterways as an integral part of the overall intermodal system. As indicated above, short-sea shipping carries about 40% of the freight within the E.U., with a growth rate nearly as high as for roads. Initially short-sea operations were mostly across the North Sea to connect noncontiguous countries. In recent years, its role has been expanding to include routes along the coasts that offer a competitive alternative to land transportation.

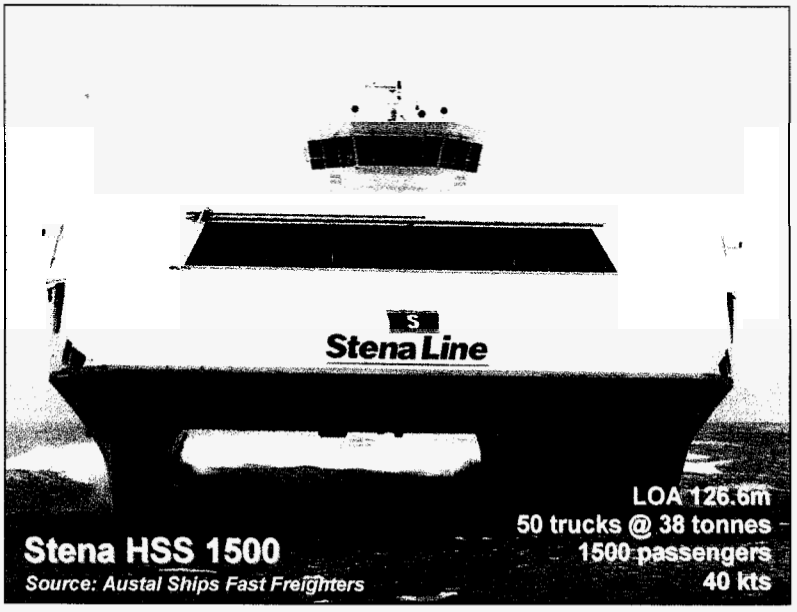
There are efficient services between Sweden, Germany, and Spain, between the ports of Antwerp and Rotterdam, and between the southeast coast of England and the inland port of Duisburg, Germany. Recently the Italian company Grimaldi initiated a fast-ferry service to carry domestic trailers (with tractors) from Genoa to Barcelona in 12 hours. This service allows truckers to avoid the busiest highways in Europe with

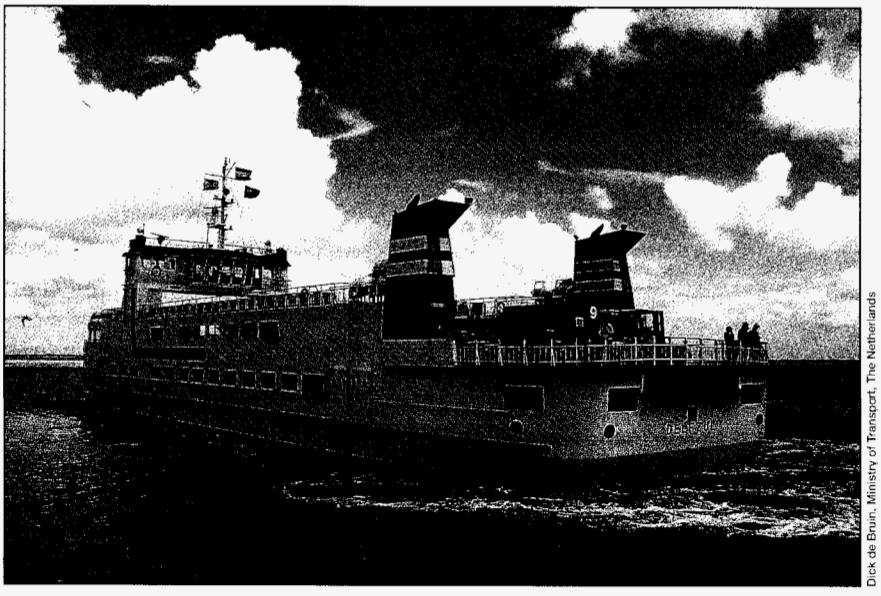


Damen Shipyards

The newly initiated E.U. program, named "Sea Motorways", includes combining short-sea shipping between the E.U. countries with inland waterways to develop water corridors without infrastructure or administrative bottlenecks. River-ocean vessels are effectively operating on inland and short-sea routes. Shown is one type of such vessels built at Damen Shipyards in the Netherlands, with capaciity close to 3,000 tons, 84-meter length, 12.5-meter beam and 4.5-meter maximum draft.

Coastal or short-sea shipping is the fastest growing mode of transportation in Western Europe. Shown here is a combination freight and passenger ferry capable of reaching a speed of 40 knots.





Dick de Bruin, Ministry of Transport, The Netherlands

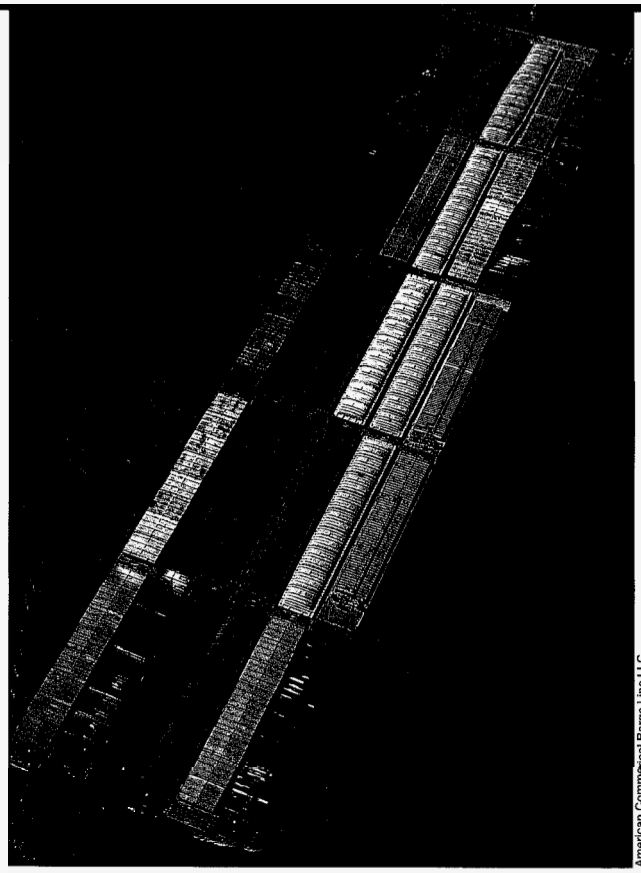
Shallow-draft ferry operating in the Wadden Sea in the Netherlands and accommodating 400 passengers and 100 cars with a draft of only 0.9 meter.

competitive delivery time and costs. Similar routes are being considered between Germany and Poland.

A consortium of Turkish trucking lines established its own ferry service to Trieste, Italy, to reduce road travel to Western European destinations. There are many more examples of extensive application of both passenger and freight ferries in the E.U.

Inland waterways and short-sea transportation complement each other well, especially with the fleet of "river-sea" vessels. The major North Sea ports successfully use inland waterways for a large part of their container traffic. Some countries not connected to the North-West European network have their own systems, such as the Rhone, the Po or the Douro, which are becoming increasingly important at the regional level, and also in the development of river-sea transportation.

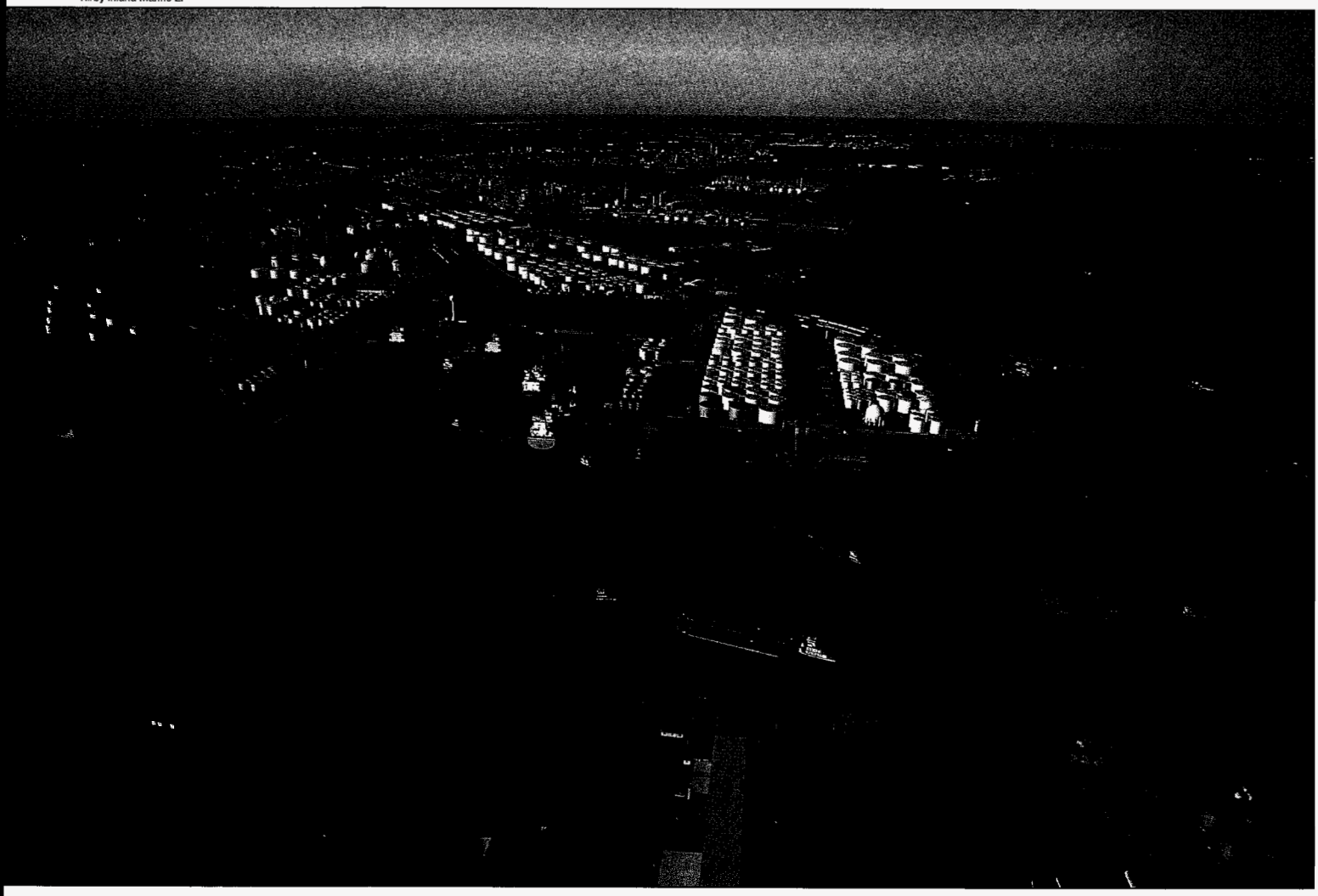
The Mississippi River has no locks or dams below St. Louis, providing 1,000 miles of an unobstructed navigation channel to the deep-draft ports of Baton Rouge and New Orleans, Louisiana, and beyond. Tows of 30 or more barges are not unusual, like this down-bound 31-barge tow moving grain and petroleum products.



American Commercial Barge Line LLC

Towboats shuttle barges loaded with petroleum and chemical products between refineries, chemical plants and other facilities in the busy Port of Houston, Texas. America's fourth largest city, Houston credits much of its growth to the Houston Ship Channel, completed in 1912, which provides a deep-draft channel to the Gulf Coast some 50 miles away.

Kirby Inland Marine LP



The latest White Paper assumed that short-sea and inland waterways transportation would not reach a desirable level of market share spontaneously, but should be assisted by the E.U. to encourage start-ups and give these initiatives an attractive commercial dimension.

In Europe, it is recognized that short-sea and river-sea transportation belongs to the category of innovative and environmentally sustainable projects, which need initial support to be established. The latest White Paper stated: "These lines (short sea and river-sea) will not develop spontaneously. Based on proposals from the member states, they will have to be sign-posted, notably by granting European funds from the Marco Polo program and the structural funds to encourage start-ups and give them an attractive commercial dimension."[16]

This policy is well illustrated by one of the recent proposals to expand short-sea operations. This particular proposal considers a ferry service between terminals at Fos (Marseille), France, and Savona, Italy.[17] The service offers truckers a maritime option to avoid crossing the Alps and Pyrenees. The distance by sea is 370 km with berth-to-berth transit time of 13 hours.

The expenditure for operations for a three-year period is estimated at €38 million. Most of it should come by partnerships between ship operators, ports and users. Direct transportation savings for the initial stage of operations is, however, short by about €5 million. It is expected that these additional funds will come as a public aid, specifically about €1 million from the E.U. under the Marco Polo program and about €4 million from existing national and regional programs promoting the reduction of road congestion.

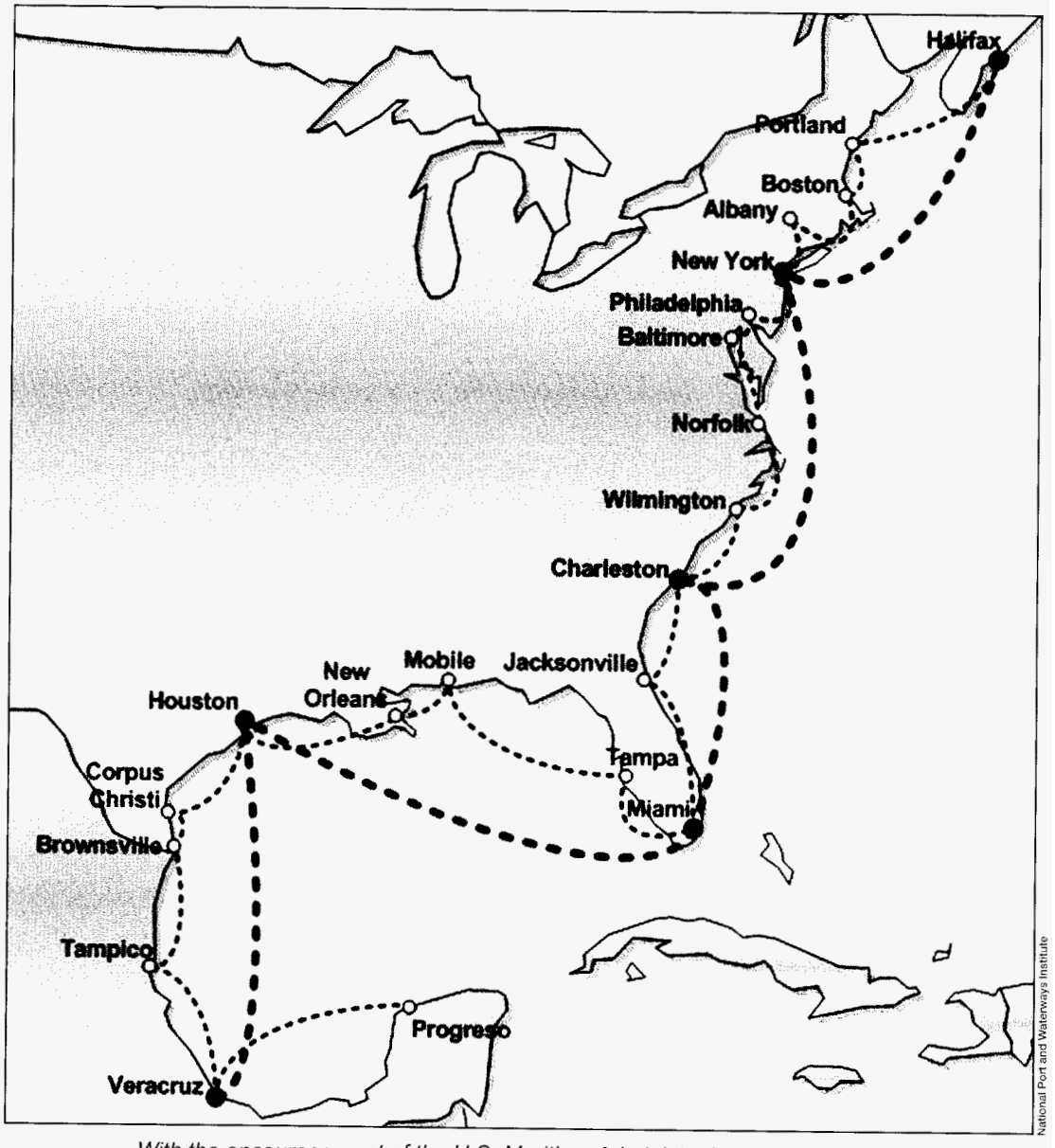
The public aid is being justified by the following considerations of alternatives:

- cost for road expansion is in the range of €5 to €25 million per km.
- estimated cost of Lyon-Turin railroad project is €11 billlion
- annual marginal external cost savings (accidents, noise, pollution, etc.) is €2.8 milllion in accorance with estimates by the European Commission.

In addition to financial support, the E.U. utilizes a number of priority measures to enhance water transportation, including:

- Eliminating bottlenecks, providing missing links, revitalizing waterways which have fallen into disuse, establishing links to rivers and installing transshipment equipment;
- Installing highly efficient navigational aids and communication systems on the inland waterway network;
- Continuing to standardize technical specifications for an inland waterway network;

Proposed Coastal Shipping Service



With the encouragement of the U.S. Maritime Administration, transportation planners are studying the possibility of a coastal shipping service along the Atlantic and Gulf Coasts, and extending into Mexico. The aim would be to move domestic trailers and international containers off busy highways.

• Harmonizing pilot certifications and the rules on rest times for crew members.

Although there have been numerous attempts by private operators to establish river-sea lines on the Lower Mississippi and across the Gulf to Mexico and to Central America, none has succeeded.[18] Difficulties in starting up, initial financial losses, lack of support in market development, and institutional barriers are listed among major reasons for termination of these services.

Extensive efforts are being focused in the U.S. on revival of short-sea and coastal shipping to reduce congestions on busy coastal highways. Inland and coastal barges are utilized to distribute marine containers between coastal ports on the routes such as New York–Boston and New Orleans–Houston. Coastal barges have capacity in the range of 400- 700 TEU and are being pulled by tugs with a speed about 10 knots.

In the research stage is development of a concept to accommodate not only marine containers but also domestic trailers. This concept is based on utilization of roll-on, roll off ferries with delivery time compatible with trucking services. The ferries, accommodating about 50 trailers and containers, should operate between terminals located outside of international ports and functioning also as truck stops. The proposed deployment includes two overlapping systems—one on short routes, utilizing Fast ferries (about 25 knots) and another on long routes, utilizing High-speed ferries (about 35 knots). The latest analyses are focused on initiating first freight ferry service in the New York/New Jersey-New England corridor, along most congested segments of I-95 Interstate highway. The traffic density on this route is sufficient to support frequency of at least two departures per day.[19]

VI. Research Programs

In order to improve the commercial viability of domestic water transport, a priority in the E.U., a number of research projects have been completed (in addition to many research programs conducted by the member states), first by the so-called Fourth Framework Program, 1994–1998, and then currently under the Fifth Framework Program, 1998–2002. These programs have been conducted as a part of the E.U.-wide Research and Technological Development initiative, RTD. One of the objectives of the RTD is to help political decision-makers meet the growing needs by quantifying trends within European transport and assessing the impact of the various political options.

The research projects covering waterways have been grouped together in the form of "Concerted Action" called "INCATS," with the objective of bringing together representatives of governments, industry, and research organizations to exchange ideas and promote the practical application of the research. The Concerted Action on inland waterways aims to coordinate research on inland navigation and identify how greater use can be made of inland waterway transport, with a view toward integrating the inland waterways with the European intermodal transport chain.[20] Some of the research projects include:

SHIFTING CARGO: This research project "seeks to increase the utilization of... Europe's waterways... by the identification of short and long-term strategies, and to submit proposals and guidelines for pilot projects."

The Brunsbuttel Lock is situated at the entrance to the Kiel Canal, the busiest man-made waterway in the world. Annually over 60,000 ships and 25,000 yachts pass through the canal, which links the Elbe River with the Baltic Sea at Kiel, Germany.

E.U. political decisions, formulated in the White Paper, are based on the large-scale Research Framework Program. Part of this program (INCATS) defines greater uses for waterway transport.

IMMUNITY: This project researches the "Impacts of Increased and Multiple Use of Inland Navigation." A main objective of the project is to provide "scientific support to policy-makers with respect to environmentally friendly inland navigation."

INCARNATION: Concerned with "the provision of vessel traffic information services for inland waterways to supply river navigators, directly onboard their vessels, with operational traffic images from the shore-based radar and other information sources."

INDRIS: The aim of this "Efficient River Information System" (VTS) project is to provide "open" information systems based on the same standard (harmonized at the European level), which assist in tactical navigation decision-making on inland waterways.

PROSIT: This "communication-links" project for "Promotion of Short Sea Shipping and Inland Waterway Transport" is concerned with the improvement of communications between shippers, agents, freight forwarders and shipping companies.

EUDET: This project for river transport on the Danube River will provide a comprehensive evaluation of the Danube waterway's efficiency as a key infrastructure of the South-East axis supporting traffic flows between western and eastern Europe.

CATRIV: This research project develops a "Conceptual Analysis for Transportation on Rivers in Urban Areas." Its aim is to gauge the technical, economic and environmental feasibility of transporting passengers and goods for short distances in urban areas via inland waterways with a view to reducing road congestion.

ECO: This research project for "environment-friendly ports" seeks practical and cost-effective solutions to major environmental problems experienced in European seaports which could provide the basis for the formulation by the European Commission of policies, guidelines and implementation programs.

VII. Summary and Conclusions

In the last decade, domestic water transportation in the U.S. has not exhibited any growth, while national freight traffic has increased by 23%.

While the U.S. and the E.U. have similar overall economies, there are major differences in formulating policies toward water transportation.

In the E.U., roads are the dominant mode of freight transportation, and the shifting of traffic to rail and water (coastal and inland) is a significant directional change in transportation policy.

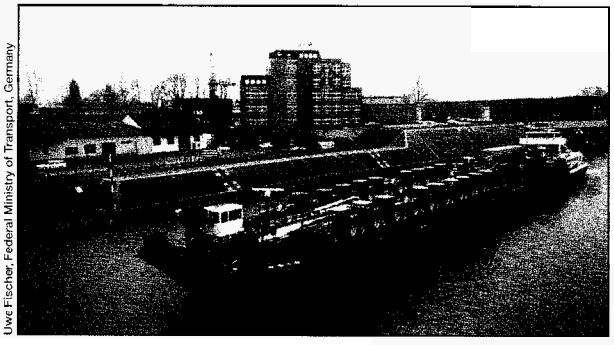
The U.S. in general has a more balanced freight allocation and traffic growth between roads and rail. Domestic water transportation capacity, however, is not fully utilized in the expansion of national intermodal operations.

The waterway system in the U.S. is more extensive than in the E.U.; all indicators related to the total length, channel dimensions, and density of traffic are higher while costs per ton-mile are about five to 10-fold lower.

Inland waterways transportation in the E.U., however, provides more diversified services, is better integrated in the overall intermodal system, and exhibits a modest but still higher rate of traffic growth. Most importantly, in the E.U., water transportation is widely recognized as a priority for further development and public support.

From the beginning of the last decade, the European Council has issued a series of documents formulating new directions for transportation policies in Western

Coastal barges like the Columbia Baltimore move containers between U.S. ports.



Uwe Fischer, Federal Ministry of Transport, Germany

Roll-on roll-off (or ro-ro) service is common in U.S. for sailings to destinations like Puerto Rico, but it is practically unknown on the river system. This ro-ro barge makes its way down the Rhine River.

Europe. These documents explicitly promote inland and coastal water transportation as environmentally superior, safe, economical in the use of nonrenewable energy, and having significant capacity to relieve the overloaded highway network.

Policy directions in the E.U. have been implemented using a variety of mechanisms [21] to enhance water transportation by:

• Deregulation and fleet modernization.

• Numerous programs of direct public aid, covering 30% to 50% of projects' capital costs if resulting in the shift of freight to water.

•Significant increase in road user charges to account for costs related to environmental, safety, and social impacts.[22]

• Opening funds collected by user charges between the modes to finance environmentally advantageous modes such as water transportation.

• Inclusion of inland waterways in Trans-European and Pan-European corridors, which receive priority in financing and further integrate waterways in intermodal operations.

• Introduction by the E.C. the concept of "sea motorways," linking coastal and inland shipping routes, and defining them as a category of innovative and environmentally friendly services entitled to public support for startup and initial operations.

• Political decisions in formulating transportation policies are being based on a large-scale Research and Development Initiative. Part of this initiative, titled INCATS, focused on greater uses for waterway transport.

• The E.U. has established a clear modal prioritization system and developed a broad-based program to support the modes defined as priorities. Inland and coastal shipping are considered priorities due to their ability to accommodate growing transportation demand, relieve congestion, and provide environmental and safety benefits.

• In contrast, policy and planning documents in the U.S. avoid modal

Uwe Fischer, Federal Ministry of Transport, Germany

A ship in the Untertuerkheim Lock at Stuttgart on the Neckar River, which flows northwest from the Black Forest to the Rhine River near Mannheim, Germany. In Europe, many tributaries like the Neckar are used for commercial and recreational navigation.

prioritization, or even the appearance of official support for one mode over another.

• Existing initiatives, such as TEA-21, intended to assist formation of the U.S. intermodal system, barely mention inland and coastal water transportation.

• There is no mechanism in U.S. transportation policy to credit water transportation for savings in external costs due to its environmental and safety advantages. Moreover, and ironically, environmental requirements have become a major barrier for implementation of U.S. waterways improvements. ■

A. Hochstein

In this day of diesel engines and sleek river craft, wind-powered boats are still seen in some developing countries, like Bangladesh.

Footnotes

[1] Norbert Krause. "Aspects of German Waterways Policy," PIANC Bulletin 85, 1994.

[2] "Fair Payment for Infrastructure Use: A Phase Approach to a Common Transport Charging Policy in the E.U." White Paper (COM/98/466).

[3] "Barging into the Seine," Containerization International, October 2001.

[4] The Journal of Commerce, May 28-June 3, 2001.

[5] ADEME. French Environment and Energy Management Agency. "Integrated transport system in the European Union," by M. Janic and A. Reggiani, Transport Reviews, October–December 2001.

[6] "Access to Louisiana Freight Terminals: An Intermodal Transportation Planning, Framework for Needs Assessment and Funding," National Ports and Waterways Institute, University of New Orleans, December 2000.

[7] "Inland Navigation System Planning: The Upper Mississippi River-Illinois Waterway," by the National Research Council, February 2001.

[8] "Transport Report 2000, Integrated Transport Policy—Concept for a Mobile Future," Federal Ministry of Transport, Germany, November 2000.

[9] Containerization International, June 2003.

[10] "Fair Payment for Infrastructure Use: A Phase Approach to a Common Transport Charging Framework in the E.U."—White Paper (COM/98/466).

[11] "Promotion of Intermodality and Intermodal Freight Transportation in the European Union," Resolution of 14 February 2000. OJ 56.29.02.2000

[12] "European Commission White Paper: European Transport Policy for 2010," September 2001.

[13] EC Regulation 2255/96.

[14] Inland Waterway Freight Grants, Department of the Environment, Transport and the Regions, U.K.

[15] In Europe, the term "motorway" is similar to the U.S. term "highway."

[16] "European Commission White Paper "European Transport Policy for 2010: Time to Decide," September 2001

[17] Alain Cousin, "A Mediterranean ro-ro alternative to trans-Alpine road routes," Terminal Operator Conference, Genoa, Italy, June 2003.

[18] "Maritime System of the Americas: River Ocean Operations," National Ports and Waterways Institute, Louisiana State University—Maritime Administration, Report # DTMA 91-92-CAA-200094, November 1993

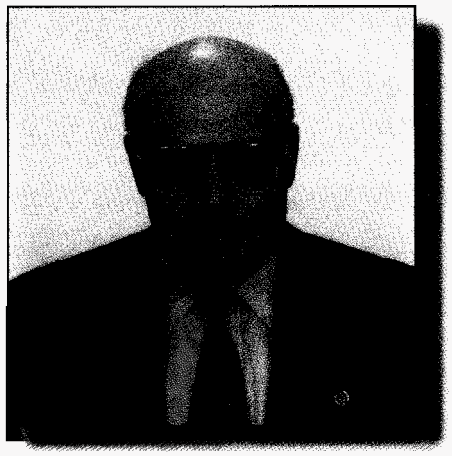
[19] High-Speed Ferry and Coastwise Vessels." National Ports and Waterways Institute, University of New Orleans, 2003.

[20] European Commission Web Site, Transport RTD Program – INCATS.

[21] White Paper on Transportation Policy for 2001, published by the E.C. in September 2001, lists 60 means to achieve policy objectives.

[22] There are practically no user charges for inland waterways in the E.U., and in accordance with the E.C. assessment, their external costs are close to zero.

Biography



Dr. Anatoly Hochstein is Director and Professor of the National Ports and Waterways Institute, University of New Orleans. As the first Director of the Institute, Dr. Hochstein is charged with formulating a comprehensive program of research, advisory service, training, and education for the advancement of the maritime industry.

Concurrently, he is vice president of the consulting company, Louis Berger Group. He has a prominent career in the field of water transportation and is well recognized as one of the leading experts in ports/ waterways planning. His expertise encompasses diversified disciplines ranging from analysis of trade/shipping patterns and institutional and managerial frameworks to fleet operations and feasibility of structural and non-structural waterway improvements. He has been responsible for a variety of critically important water transportation research projects worldwide, and thus has an intimate knowledge of the international maritime transportation industry, operating in different geographic and economic situations. He received his M.S. with honors in Hydraulic Engineering from Leningrad Water Transportation Institute in 1955 and his Ph.D. in Economics from Moscow Navigation Research Institute in 1963.

Acknowledgements

The author is most grateful to the many organizations and individuals on both continents who have provided information, illustrations and advice. Specifically, the author would like to acknowledge Harry Cook, President Emeritus, National Waterways Conference, Inc.; Dick de Bruin, Ministry of Transport, the Netherlands; Uwe Fischer, Ministry of Transport, Germany, and Karin de Schepper, Secretary-General, Inland Navigation Europe.