



A SWIFT TURNAROUND? PORT CALL OPTMIZATION TO ABATE EMISSIONS

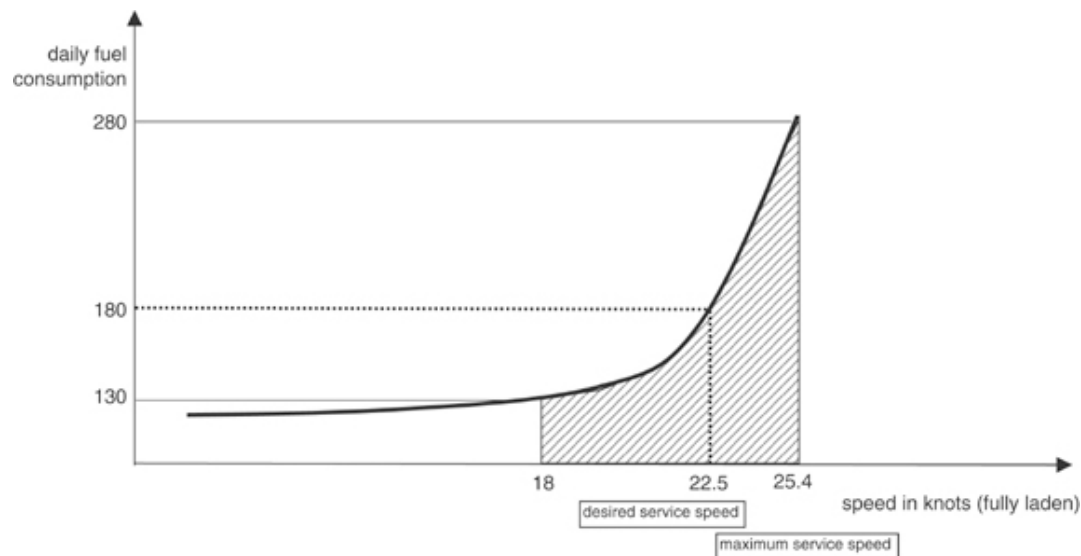
René Taudal Poulsen
and Helen Sampson

SIGNIFICANT ABATEMENT POTENTIAL

Reduced port time will enable ships to reduce speed without adverse effects on ship productivity or cargo transit times

Due to the 'cubic rule of speed', such measures hold significant saving potential

Jia et al. (2017) identified significant unproductive waiting time for tankers and estimated a fuel saving potential in the range of 7.26 to 19 per cent.



Eide et al., 2009; Bazari and Longva, 2011; Faber et al., 2011; Johnson and Styhre, 2015; Jia et al., 2017; Andersson and Ivehammar, 2017; BIMCO 2018; 2019a; BIMCO 2019b; ITPCO 2019a; ITPCO 2019b; STM 2019

Source: Notteboom, T. E. (2006). The time factor in liner shipping services. *Maritime Economics & Logistics*, 8(1), 19-39.

TRAFFIC MANAGEMENT REDUCES ONSHORE CONGESTION, WAITING TIME AND EMISSIONS



Real-time traffic information helps drivers time their departures effectively and avoid congestion

In trucking: Yang and Koutsopoulos 1996; Jou et al. 2005; Vlassenroot et al. 2010; Lee et al. 2010.

In rail: Mazzarello and Ottaviani, 2007; Corman et al. 2009; Quaglietta et al. 2016.

In aviation: van Manen and Grewe 2019.

WHY DO SHIPS WAIT IN PORT?

1. Interviews with 30 top and middle shipping managers in chartering, operations and technical departments (21 companies, 2012-14 and 2018)
2. Ethnographic observations onboard two tankers for several weeks (handy and panamax tankers, trading in Northern Europe, and South/North America)
3. Content analysis of Lloyd's List articles regarding idle time in port, 1990-2019

WHY DO SHIPS WAIT IN PORT?

Different phases of the port call:

1. Anchorage
2. Approach to port
3. Mooring
4. Tank inspection
5. Cargo-operations
6. Post-cargo operations
7. Departure



Ships wait for different reasons

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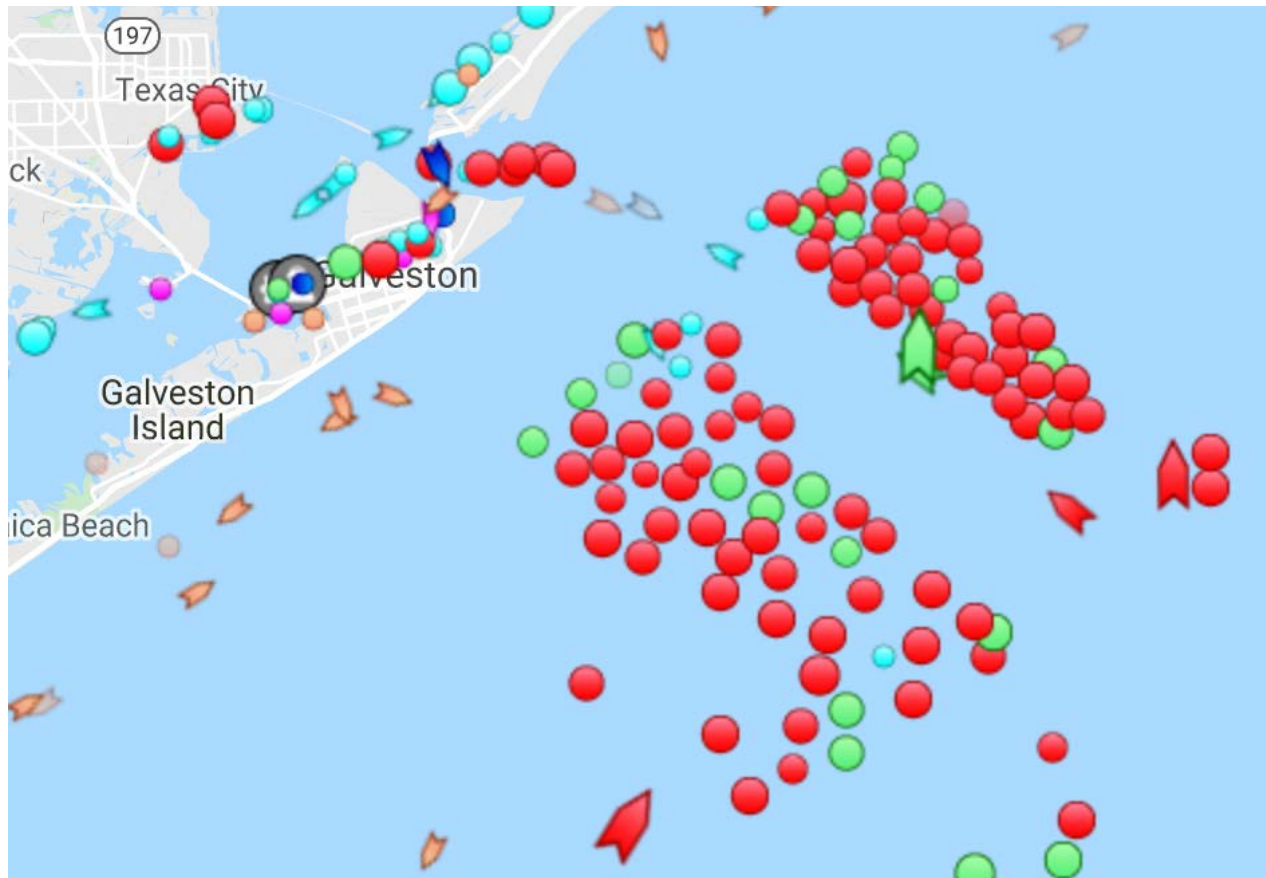


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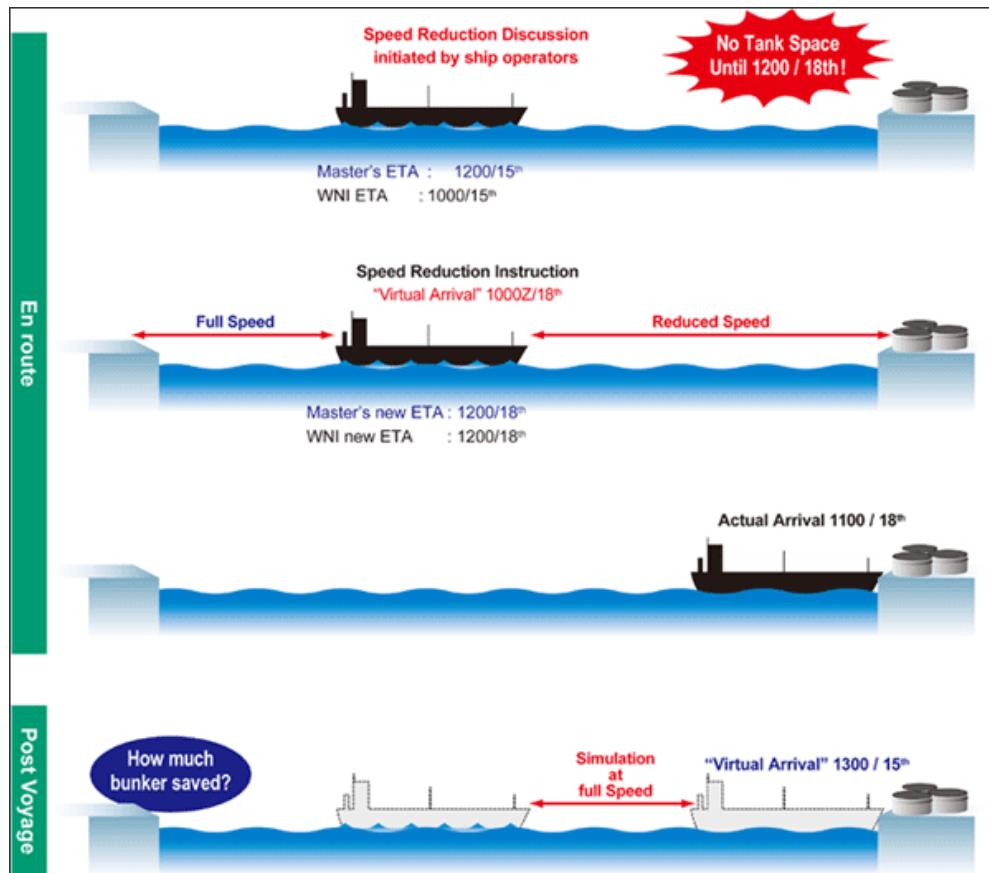
WAITING AT ANCHORAGE

TANKERS WAITING AT ANCHORAGE



Off the Port of Houston
Texas, USA
February 18, 2020
Source: Marine Traffic

VIRTUAL ARRIVAL AS SOLUTION



Source:

<http://weathernews.com/TFMS/topics/seminar/2009/20090806.html>, accessed on September 28, 2018

WHY DO SHIPS WAIT AT ANCHORAGE?

1. Port and terminal logistical challenges cause waiting time at anchorage
2. Cargo-owners are more concerned about cargo values than fuel savings and prefer to have ships waiting at anchorage
3. Lack of trust hampers virtual arrival (ports have first-come-first-service policies)

WHY IS VIRTUAL ARRIVAL NOT USED?

“Not even BP, which have stopped using it. ...

Why it did not work? My theory is that the cargo is so worth so much more... [than the fuel savings from virtual arrival]...

You [the cargo-owner] prefer flexibility...

It would not be difficult for us to offer virtual arrival. ... We would do it, if people asked for it.”

Vice president for tanker chartering, 2018

THE "BRO ELIZABETH" VIRTUAL ARRIVAL CASE

Fuel savings achieved by BP and Maersk with virtual arrival for a single voyage for the "Bro Elizabeth", 2009

Freight bill without virtual arrival clause	\$	539.400
Freight bill after the exercise of virtual arrival clause	\$	527.000
Freight savings due to virtual arrival clause	\$	12.400

Source: BP/Maersk (2010). *Virtual Arrival*. BP Shipping and Maersk Tankers, https://weathernews.com/TFMS/topics/seminar/2010/pdf/4_BP_Maersk.pdf, accessed on July 6, 2018.

Theoretical calculation on the effects on cargo value of a 4 per cent increase in the oil price

Bro Elizabeth's deadweight (dwt)		37.000
Bro Elizabeth's capacity in barrels (assuming 7,35 barrels per ton)		272.059
Cargo value at an oil price of USD 50 per barrel	\$	13.602.941
Cargo value at an oil price of USD 52 per barrel	\$	14.147.059
Difference in cargo value in case of a 4 % increase in oil price	\$	544.118

Source: Own calculation, assuming that the "Bro Elizabeth" was loaded with ~~37,000 tonnes of crude oil~~

WHY IS VIRTUAL ARRIVAL NOT USED?

“Virtual arrival clauses? We also have that. It’s not widely accepted in the gas tanker industry. Yes, but, eh, the theory is good. Practice is difficult. ... It’s because of trust. I don’t think many terminals have trust.

... In some parts of the world, trust comes in very short supply. If you call them and say: I should have arrived 1700 hrs, but I will only arrive at 2300 hrs, they will just say, okay, then your arrival time is 2300 hrs. ...

It’s a question of trust. And when you look at the way shipping works, trust does not have prominent spot. It’s all about verification and control.”

Tanker shipping company CEO, 2018



POST CARGO OPERATIONS

DEPARTURE TIME DEPENDS ON PORT STAKEHOLDERS

“When should I give the pilot a notice? Shall I gamble and say that all paper work will be completed within the next two hours? And then give him a notice now?

... Or shall I wait until I have received all the papers? And then I will postpone it several times. So it's a bit of a gamble.

Some pilots get very annoyed, if we tell them that we will be ready within two hours, and then, unfortunately, we are not ready, because we are still waiting for papers...”

Vice president (technical department) in a chemical tanker shipping company, June 26, 2018

DEPARTURE TIME DEPENDS ON AUTHORITIES

“That’s the area, where we could save some time. But again, there are many factors at play here. It’s very dependent on authorities. And authorities decide.... Customs and immigration need to come onboard and say good-bye...

We have a bonus scheme for our agents. ... So we collaborate with the agents to save time. We do not wait for the agent.”

CEO in gas tanker shipping company, July 24, 2018

INTIMIDATION IN PORT

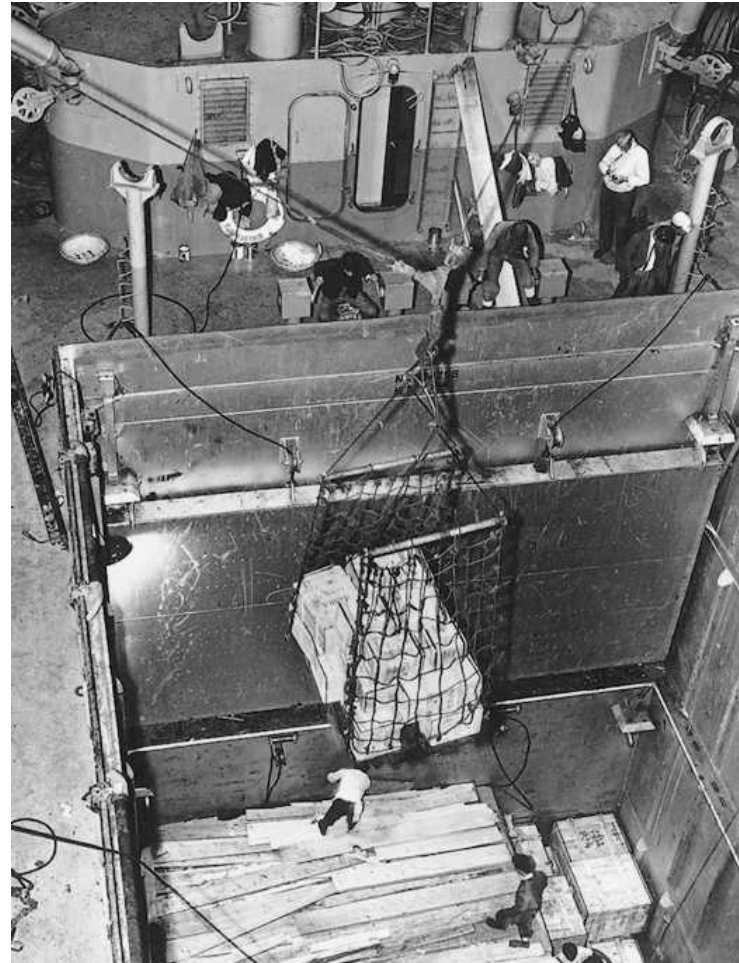
Customs takes a long time. It can really take a long time in Black Sea ports. In the Ukraine and in the other countries. It takes a long time. You do not just enter port, connect [the hoses] and start loading immediately. It takes hours, depending on how many fines they want to give you. They are very tough.

If they find something, you will get a fine... And they will always find something. Then there is something, you haven't done. And then you get a fine. This takes time.

And they come onboard, eight, six, ten, twelve men, perhaps, and check everything. ... And they all want something. Some cigarettes. Some drinks... And that takes time.

Operations and chartering manager, chemical tanker shipping, August 29, 2018

CAN NEW TECHNOLOGIES REDUCE PORT TIME?



50 years ago, containerization enabled swifter port calls

Can new technologies help shipping save time?

Yes, but cargo-owner preferences and officials' pressures on crews limit the potential

CONCLUSIONS

- Tankers wait at anchorages due to port **logistical challenges, lack of trust** and notably cargo-owners' **speculation in cargo values**
- There is a potential for port call optimization, but port stakeholders limit crews' and shipping companies' room for maneuver and **officials often cause crew stress and delays**
- The IMO can facilitate the **sharing of real-time traffic information** among port stakeholders, but also needs to **look beyond efficiency enhancing** measures to achieve the GHG goals

ADDITIONAL SLIDES

René Taudal Poulsen and Helen Sampson (2019).
'Swinging on the anchor': the difficulties in
achieving greenhouse gas abatement in shipping
via virtual arrival, *Transportation Research Part D:
Transport and Environment*, 73 (August): 230-244.

INCENTIVES IN SHIPPING CONTRACTS

Ship-owners and their counterparts, the charterers, have economic **incentives** to optimize port calls.

If a charterer causes delays in port beyond the lay-time for cargo-operations specified in the charter party (e.g., due to delayed arrival of cargoes), ship-owners are entitled to **demurrage** payments for the longer than expected use of the ship.

If a breakdown on the ship (e.g., a crane or cargo pump breakdown) causes delayed loading or discharging (longer time in port than that specified in the charter party lay time), the charterer will meet the ship-owner with a **claim**.

APPROACH TO PORT



UNDER PILOT'S GUIDANCE



“...it’s very limited what you can do actually, because it’s so much depending on the tug boats, the pilot, the shore ... and everything.”

Vice President, Operations department, Crude, product and gas tanker shipping, August 21, 2018

IMO could facilitate port stakeholders’ sharing of real-time traffic data to minimize the risks of delays

MOORING



Invest in quality ropes and mooring lines to reduce mooring time.

“...there are also some safety concerns. You don’t want to stress the crew to put the gangway down, for example, or more. It should take the time it should.”

Vice President, Operations department, crude, product and gas tanker shipping, August, 21, 2018

CARGO SURVEYS



CARGO OPERATIONS



“Typically restrictions from shore determine the speed of cargo operations. In fact, I don’t know if we use our pump capacity to the maximum.”

Head of chartering, product tanker shipping, July 10, 2018

To save time, terminals and refineries would have to invest in pumps and storage capacities

EXAMPLES OF ACTIVITIES, WHILE ALONGSIDE

- Bunkering
- Tank cleanings
- Loading of stores
- Discharging of slops and garbage
- Port state control
- Oil major vetting
- Crew changes
- Crew visits to dentists and doctors
- Hull and propeller cleanings
- Voyage planning
- Etc.



DETERMINANTS OF PORT CALL DURATION

Geopgrahy



TERMINAL OWNERS COORDINATING PORT CALLS

Interviewee: when we load in the US, the terminal is not owned by [the charterer]. But in Europe, we discharge at terminals owned by [the charterer]. Then we [the shipping company's gas tankers] are instructed about service speed [from the charterer].... so that they [the oil terminal] are ready to serve us [when we arrive].

Interviewer: Does this mean less waiting time in the European terminal, due to better coordination than in North America, where the cargo and terminal owners are two different parties?

Interviewee: Yes.

CEO in gas tanker shipping company, July 24, 2018