Value2Society™

Optimising both business & societal value to strengthen business resilience

Direct Operations & Case Studies

19 March 2021

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Route2

> The gap between what markets value & what society values is closing

> Investors are increasingly focused on the fact that risks & opportunities linked to sustainability are tangible & can have a significant impact on business performance

> Many business leaders are now adopting a more balanced optimisation of stakeholder value management mantra

> Optimising stakeholder value will present new trade-offs, in particular for resource allocation

> **Value**2Society™ can help leaders make these trade-offs in a more objective manner as they seek to pursue becoming a ...

more valued & valuable company

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Background I Route2 & Total Capital Accounting - Overview

- Route2 collaborates with businesses, investors & governments to quantify, understand and manage the total impact & wider value (**Value2**Society™) generated from their activities, throughout the value chain

- Impact quantification & economic valuation is achieved through a **Total Capital Accounting** framework, which systematically quantifies & assigns economic values to the impacts that result from a company's direct & indirect use of the six types of **capital stock** upon which it depends

Human Capital
provides physical & non-physical effort (work) & inter-personal support

Manufactured Capital
provides shelter, mechanical work, connectivity & production ingredients

Financial Capital
provides a medium of exchange, a store of value, a unit of account

Natural Capital
provides natural resources, waste assimilation and other ecosystem services

Intellectual Capital
provides instruction to production, consumption & social behaviors

Social Capital
provides ease of interactions between different stakeholders of society

- To deliver long term resilient value for all internal and external stakeholders a business needs to maintain or preferably enhance the value of all capital stocks year on year; with erosion of stock value representing a potential financial risk

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Background I Total Capital Accounting - Benefits

- Through comprehensive & quantitative consideration of its interaction with these 'Capitals', **Value2**Society™ provides **DryLog** with a robust framework to measure, manage & message its long-term value creation

- The application of **Value2**Society will provide **Drylog** with a number of distinct benefits, including:

    - Translating impacts into economic costs and benefits will enable **Drylog** to:
        - Compare impacts against a common unit, and identify risks and opportunities
        - Aggregate impacts into a single performance metric (e.g. **Value2Society, Total Contribution**)
        - Integrate sustainability considerations into financial reports and investment appraisals

    - Understand its full value chain impacts
        - Upstream - Supply chain (coal and grain case studies reported separately)
        - **Direct Operations (the focus of this phase)**
        - Downstream – Goods & Services (coal and grain case studies reported separately)

    - Prioritise interventions and understand the societal / financial trade-offs inherent in capex / opex decision making

    - Identify how current societal costs and benefits might become future financial risks or revenue opportunities

    - Prepare for a future operating landscape with evolving stakeholder demands and increased regulatory pressure

    - Provide the evidence base to access 'new' sustainability orientated finance e.g. Green Bonds

    - Develop 'first mover advantage' and a leadership role in relation to advancing the integration of sustainability in the Maritime Transport sector

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Sustainability in Maritime Transport I

- The international Maritime Transport industry is responsible for the transport of approximately 90% of the world's traded goods, 30% of which are dry bulk commodities (mainly coal, grain and iron ore)

- The UN Conference on Trade and Development expect seaborne trade to rise at an average annual rate of 3.4% up to 2024 (UNCTAD, 2019)

- Although shipping is the most sustainable way to transport bulk cargo, the increasing pressure of environmental and social regulations means that the sector must quickly adapt. This development has become increasingly important, as without intervention, CO_2 emissions from international shipping could grow between 50-250% by 2050 (IMO, 2014)

- Currently, shipping accounts for ~3% of all Greenhouse Gas Emissions. The IMO have set an ambitious target to reduce annual GHG emissions by at least 50% by 2050 and limit the volume of sulphur in fuel oil to a maximum of 0.5%

- The emphasis placed on reducing GHGs has lead to the creation of carbon accounting tools, such as that created by RightShip. Although RightShip also reference 'safety' impacts, the tool lacks coverage across the full complement of total capital impacts (i.e. human, intellectual, social, natural, manufactured and financial)

- Similarly, banks have developed the Poseidon Principles to align shipping loans with decarbonisation trajectories resulting from more efficient fuel consumption (Poseidon Principles, 2020). However, besides carbon emissions no other measures regarding other impacts of maritime trade are taken into account

- Regulatory changes regarding security (Safety of Life at Sea Convention), labour standards (Maritime Labour Convention), and health and wellbeing do exist. These have been created to improve employee working conditions, however there is a lack of concordance between the initiatives, and none of them capture the full depth and breadth of material sustainability considerations

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Sustainability in Maritime Transport I

- In response to the new environmental and social regulations, several Maritime Transport companies have adopted operational efficiency measures to reduce their carbon footprint and are now reporting on their sustainability targets (i.e. COSCO Shipping, Eagle Bulk, Genco, Maersk, Scorpio Bulkers)

- The majority of the reported changes are environmental and are achieved through the adoption of fuel efficient technologies, i.e. technical retrofitting. The benefits of common technical retrofitting technologies are quantified in this report. The **Value2**Society approach helps to address the shortfalls of current reporting practices:

    - The majority of the environmental impacts being measured are focused on air emissions (i.e GHGs, SOx, NOx and other particulate matter being released into the atmosphere). Although ambient air pollution is a large contributor to the negative environmental impacts associated with the Maritime Transport sector, given the nature of the industry, there are also water related impacts that are important to consider

    - The socio-economic benefits of employee and seafarer training and wellbeing programmes are not contextualised or quantified. These are increasingly important to discuss, especially because most vessels carry a flag of convenience, an issue openly criticised by the International Transport Workers' Federation (ITF, 2020)

- In response, **Route2** have created a selection of shipping specific impact indicators to cover a wider range of impacts relevant to the Maritime Transport sector (e.g. Black Water Generation, Technical Retrofitting)

- Such analysis has not previously been undertaken within the international Maritime Transport sector

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Executive Summary

- **Value2**Society™ enables businesses to better understand their total impact & the wider value generated for society. This project has applied the **Value2**Society framework to Drylog's direct operations, by quantifying and evaluating a range of positive and negative impacts. This has provided a baseline assessment of Drylog's annual **Value2**Society (initially for the year 2019), and a platform from which Drylog's sustainability strategy can be developed

- The **Value2**Society generated by DryLog's direct 2019/20 direct operations has been calculated to equal **€3.82 million** at a group level, **€1.55 million** shore-side and **€2.27 million** ship-side

Top 3 Economic Benefits	Value2Society	Top 3 Economic Costs	Value2Society
Global Living Wage	+ €5.08 million	Air Pollutants	- €8.02 million
Training & Development	+ €1.87 million	Greenhouse Gas Emissions	- €3.01 million
Technical Retrofitting- Scrubbing	+ €1.17 million	Black Water Generation	- €1.18 million

- The overall benchmarking result, using 15 ship-side impact indicators ranks DryLog first of the 4 companies analysed when normalised by deadweight tonnage, with leading performance in Ballast Water, Black and Grey Water Generation, and Optimised Hull Form

- Route2 has also assessed downstream impacts in relation to two case studies, the transportation of coal and grain.

- The full and comprehensive application of **Value2**Society will provide DryLog with first mover advantage in the Maritime Transport sector, as it responds to evolving stakeholder and regulatory demands; and enables Drylog to effectively integrate sustainability into future decision making processes

DryLog Value2Society

Contents

Scope

DryLog Value2 Society

Scope I Overview

- This report provides an annual quantification of DryLog's **Value2**Society™, for the 2019/20 financial year
- This analysis covers both **positive** & **negative** impacts arising from DryLog's direct business, including both shore-side and ship-side impacts. Ship side comprises 7 ADK managed vessels and 4 CTM managed vessels
- The upstream and downstream impacts of transporting coal and grain have been analysed separately, DryLog's **Value2**Society from transporting these commodities is €**12.64 million** (please see separate case study section)
- **29** discrete **impact indicators** have been used to quantify the **Value2**Society™ generated by DryLog's direct business activities. **18** are focused on shipside operations, **8** cover both shoreside and shipside, with the remaining **3** relevant only to shoreside operations
- Impact indicator values comprise **'internal'** and / or **'external'** components, and are represented as economic costs or benefits.
- Internal costs & benefits are those incurred and accrued by DryLog, for example the costs associated with reduced productivity resulting from a crew injury.
- External costs & benefits are those incurred and accrued by DryLog's **external stakeholders**, for example the costs associated with the reduced well being of the crew member subject to the injury. External stakeholders comprise:
    - **DryLog Employees** e.g. income received from a Global Living Wage
    - **Government** e.g. medical costs associated with Workplace Injuries
    - **Wider Society** e.g. damage costs associated with Greenhouse Gas Emissions & climate change
- DryLog results are further contextualised by benchmarking against Eagle Bulk, Scorpio Bulkers and Genco using 15 ship-side impact indicators

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Scope I Impact Indicators

Upstream → **Direct** → **Downstream**

Not yet in scope

Separate Case Study

- There are 29 impact indicators* in the Direct Operations analysis with those highlighted in blue focused solely on shipside operations

Capital	Impact Indicators
Financial	Gross Value Added (GVA) - Profit
Human	Bullying, Discrimination and Harassment (BDH)
	Employee Engagement
	Employee Malpractice
	Global Living Wage
	Gross Value Added (GVA) - Employment Costs
	Health and Wellbeing**
	Health Insurance Benefits
	Site Safety
	Workplace Injuries
	Workplace Fatalities
Intellectual	Employee Turnover
	Research & Development**
	Training & Development
Manufactured	Optimised Hull Form
	Technical Retrofitting - Energy Efficient Propellers

Capital	Indicators
Manufactured	Technical Retrofitting – Engine Modifications
	Technical Retrofitting - Low Friction Hull Coating
	Technical Retrofitting - Scrubbing
Natural	Air Pollutants
	Ballast Water
	Black Water Generation
	Environmental Incidents
	Grey Water Generation
	Greenhouse Gas Emissions
	Heavy Metals & Base Cations
	Operational Discharges
	Particulate Matter
	Waste Generated
Social	Community Investment**
	Gross Value Added (GVA) - Tax

* GVA is counted as a single impact indicator despite being split across 3 capital stocks
** Shoreside only

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Scope I Impact Indicators – Benchmarking (direct operations)

- **15** ship-side impact indicators are used to benchmark DryLog performance against **3** peers

Capital	Impact Indicator Coverage	DryLog	Eagle Bulk	Scorpio Bulkers	Genco
GVA	Gross Value Added – Profit	✓			
Human	Bullying, Discrimination and Harassment	✓	✓	✓	✓
	Employee Engagement	✓			
	Employee Malpractice	✓			
	Global Living Wage	✓			
	Gross Value Added- Employment Costs	✓			
	Health and Wellbeing	✓			
	Health Insurance Benefits	✓			
	Site Safety	✓			
	Workplace Injuries	✓			
	Workplace Fatalities	✓			
Intellectual	Employee Turnover	✓		✓	✓
	Research & Development	✓			
	Training & Development	✓			
Manufactured	Technical Retrofitting - Energy Efficient Propellers	✓		✓	✓
	Technical Retrofitting - Engine Modifications	✓		✓	
	Technical Retrofitting - Low friction Hull Coating	✓	✓	✓	✓
	Technical Retrofitting - Optimised Hydrodynamic Hull Form	✓		✓	
	Technical Retrofitting – Scrubbing	✓	✓	✓	✓
Natural	Air Pollutants	✓	✓	✓	✓
	Ballast Water	✓	✓	✓	✓
	Black Water Generation	✓	✓	✓	✓
	Grey Water Generation	✓	✓	✓	✓
	Greenhouse Gas Emissions	✓	✓	✓	✓
	Heavy Metals & Base Cations	✓	✓	✓	✓
	Operational Discharges	✓	✓	✓	✓

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Scope I Impact Indicators – Benchmarking (direct operations)

- **15** ship-side impact indicators are used to benchmark DryLog performance against **3** peers

Capital	Impact Indicator Coverage	DryLog	Eagle Bulk	Scorpio Bulkers	Genco
Natural	Particulate Matter	✓	✓	✓	✓
	Waste Generated	✓			
Social	Community Investment	✓			
	Gross Value Added – Tax	✓			
Total		**30**	**11**	**15**	**13**

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Scope I Maritime Transport Specific Impact Indicators I Waste Water

- One of the largest potential sources of marine pollution from vessels is the generation of waste water. The two types of waste water generated on board are black water and grey water
    - **Black water** is sewage water and waste from medical care. This type of water may contain harmful bacteria, pathogens, viruses, intestinal parasites and micropollutants
    - **Grey water** is the water that has been used in the kitchen, showers and sinks. It includes water containing dissolved or un-disclosed by-products such as fat and oil and household chemicals and detergents which are rich in phosphate, nitrate and microbiological pathogens (Westhof et al., 2016)
- Black water is either treated on the ship and released into the sea, held in a container to be treated on land, or untreated and disposed of at sea (although this is illegal, it still occurs). Grey water is often released into the water body untreated (EMSA, 2017)
- The impacts of black water and grey water treatment or dumping are not described in existing sector sustainability reports and the Sustainability Accounting Standards Board (SASB) offer no specific metrics despite being discussed
- The impacts of waste water have been analysed via the Black Water Generation and Grey Water Generation impact indicators in this report
- The **Value2**Society Black Water Generation and Grey Water Generation impact indicators evaluate the **economic cost** of waste water in terms of treatment costs

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Scope I Maritime Transport Specific Impact Indicators I Ballast Water

- Ballast water discharges also have a negative impact on the marine environment. Ballast water contains a variety of biological species ranging from plants, animals (e.g. zebra mussels), viruses and bacteria (e.g. cholera). In 2012, there was a concern that ballast water would transfer cholera from Haiti to other parts of the world (Cohen et al., 2012)

- However, the predominant concern associated with ballast water is the spread of invasive species, a topic often discussed in conventions, and raised as a significant issue by the IMO and SASB. No universal metric to quantify the impact of ballast water has been created

- Invasive species are non-native species that can cause great ecological and environmental harm to areas in which they are introduced. This results in large clean-up costs to minimise their ecological damage. It is estimated that the cost of invasive species to the EU is €12 billion a year (EEA, 2012)

- The importance of ballast water treatment to prevent the introduction of invasive species has resulted in the creation of the Ballast Water Management Convention which encourages vessels to have ballast water management systems (BWMS).

- Several companies report having BWMS on their vessels, however the reports are unable to capture:
  - The economic and ecological impacts of the invasive species that still remain despite having BWMS
  - The impact each vessel has on mitigating invasive species. Not all vessels within a company's fleet have BWMS, therefore different vessels will have different ecological impacts

- Although BWMS are essential to mitigate the spread of invasive species, they are not 100% effective, and therefore a societal cost is still incurred, albeit significantly reduced

- The **Value2**Society Ballast Water impact indicator captures the environmental clean up costs associated with the spread of invasive species, and the cost is adjusted depending on whether the vessel has or hasn't installed BWMS

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Scope I Maritime Transport Specific Impact Indicators I Flags of Convenience

- 70% of the worlds deadweight tonnage is transported by ships flying a Flag of Convenience (FoC). A FoC ship is one that flies the flag of a country other than the country of ownership. These ships are often registered in open registries that are privately operated

- The world's top three leading flags by deadweight tonnage are: Panama, the Marshall Islands and Liberia (UNTAD, 2019), all of which are considered a FoC by the International Transport Worker's Federation (ITF). DryLog's direct fleet flies the Liberian flag

- The ITF highlight that FoC may result in tax avoidance, low wages, avoiding national labour standards, poor working conditions (fatigue, no healthcare insurance), accidents and evading environmental regulations

- A prevalent issue that results from flying a FoC is an increase in the number of accidents due to a lack of regulation and training on FoC ships. Research evidences that vessels flying the Liberian flag have ~2% more accidents than closed registry flags (Jin et al., 2019).
    - Several of these accidents are caused by a lack of training, which contributes to the cost of hiring the "wrong employee", estimated at $5,000 per seafarer due to loss of productivity (Mitroussi and Notteboom, 2014)

- However, DryLog address several of the employee-related issues and therefore this indicator was removed from the scope of the analysis:
    - All crew receive training and extensive drills that are routinely carried out throughout the year including Ship Oil Pollution Emergency Plan (SOPEP) drills
    - 100% of their crew receive more than their respective national living wage
    - The crew receive health insurance benefits whilst onboard
    - The majority of the crew have responded positively to Drylog's survey regarding fatigue and physical pain during and/or after work

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Scope I Maritime Transport Specific Impact Indicators I Operational Discharge

- Sustainability reports lack information regarding the social and environmental impacts associated with lost cargo (e.g. through unloading using a grabber and discharges from washing cargo contaminated surfaces and holds)
- Experts estimate that about 0.05% of all cargo shipped is lost. Based on this assumption a study by Grote et al., 2016 states that 2.15 million tonnes of cargo is lost per year, this cargo is discharged into oceans
- The impact of lost cargo is predominantly along coastal areas due to washing and unloading in ports
- The impacts associated with operational discharge vary depending on the cargo. The present analysis has focused on coal cargo as it contains many trace elements that are of major and moderate concern to human health
- The impact of lost coal through loading / unloading and washing is evaluated in terms of leaching of trace elements (e.g. cadmium, lead and zinc) into water bodies. The proportion of commodities transported by DryLog are 30% grain, 30% coal and 40% other (average of bulk cargo).
- The analysis also evaluates the impact of 'other' cargo based on the assumption that this cargo is mainly comprised of a variety of metal ores. The analysis is based on a study by Grote et al., 2016 which estimates the average metal content of metal ores (e.g. lead, nickel, zinc), thus allowing the volume of metal discharges to be estimated
- The **Value2**Society Operational Discharge impact indicator captures the impact of cargo lost through unloading using a grabber and discharges from washing cargo contaminated surfaces and holds
- The **Value2**Society Operational Discharge impact indicator evaluates the **economic cost** of contamination from cargo lost in terms of reduced health and wellbeing

Approach

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Approach I Methodology Overview

- For the analysis of direct operations, each impact indicator evaluation method combines data provided by DryLog (or assumed inputs) with a series of impact quantification and economic valuation steps
    - Any assumptions made in the first iteration of results were reviewed by DryLog and the corresponding amendments were made for the final iteration of results

- These quantification and economic valuation steps are comprehensively researched and based on peer reviewed literature and authoritative databases

- A full transparent method for each impact indicator is provided in supporting documentation and summarised in Appendix D (Page 75)
    - Full method statements will be provided in a separate document (currently in preparation)

- The results generated from the analysis provide insights relating to:

    1. The relative magnitude of impacts
    2. The key drivers of positive and negative impacts
    3. Whether these impacts are experienced by DryLog or External Stakeholders
    4. Which external stakeholders are affected (Employees, Government or Wider Society)
    5. Comparative performance to selected peers
    6. How performance changes over time (once multiple years of input data are added to the analysis)

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Approach I Methodology Overview

- The impact indicators were selected by
  - Researching the impacts of the Maritime Transport sector;
  - Exploring information and data presented in CSR reports (Eagle Bulk, GasLog, Genco and Scorpio Bulk);
  - Using the Sustainability Accounting Standards Board (SASB) Marine Transportation standard; and
  - The availability of DryLog data for the owned fleet
- The information provided by the CSR reports was examined to see the frequency in which the same impact indicators were listed. A table describing the frequency of impact indicator reporting is found in Appendix C (Page 74)
- The valuation approach for the selected impact indicators is introduced in the table below. Appendix D (Page 75) provides a more detailed description and valuation method

Capital	Impact Indicator	Description
GVA	Gross Value Added (GVA)	The economic benefit to the economy in terms of profit generated, taxes paid and employee compensation
Human	Bullying, Discrimination and Harassment (BDH)	The economic cost of incidences of workplace bullying, discrimination & harassment in terms of a reduction in health and wellbeing
	Employee Engagement	The economic benefit of employee engagement in terms of avoided productivity losses
	Employee Malpractice	The economic cost of employee malpractice (e.g. fraudulent certificates) in terms of lost revenue and consequential costs of crime
	Global Living Wage	The economic benefit of receiving a global living wage in terms of increased individual income
	Health and Wellbeing	The economic benefit of health and wellbeing in terms of avoided wellbeing and productivity losses and avoided employee and government healthcare costs
	Health Insurance Benefits	The economic benefit of providing healthcare insurance for employees in terms of displaced healthcare costs and avoided wellbeing loss
	Site Safety	The economic benefit of site safety (such as providing PPE) in terms of avoided injuries and productivity loss

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Approach | Methodology Overview

Capital	Impact Indicator	Description
Human	Workplace Injuries	The economic cost of workplace injuries that incur a period of absence for recovery in terms of reduced productivity, reduced wellbeing and increased healthcare costs
	Workplace Fatalities	The economic cost of workplace fatalities in terms of reduced productivity, loss of wellbeing, reduced household income and increased compensation and healthcare costs
Intellectual	Employee Turnover	The economic cost of employee turnover in terms of increased logistical costs, reduced productivity and reduced tax revenue
	Research & Development (R&D)	The economic benefit of investing in research & development in terms of increased knowhow and productivity to the company
	Training & Development (T&D)	The economic benefit of investing in employee training & development in terms of increasing productivity and employee skillsets
Manufactured	Optimised Hull Form	The economic benefit of optimising the hull's hydrodynamic form in terms of reduced fuel consumption and ambient air pollutants, and therefore avoided health and wellbeing loss
	Technical Retrofitting - Energy Efficient Propellers	The economic benefit of installing energy efficient propellers in terms of reduced fuel consumption and ambient air pollutants, and therefore avoided health and wellbeing loss
	Technical Retrofitting - Engine Modifications	The economic benefit of installing engine modifications in terms of reduced fuel consumption and ambient air pollutants, and therefore avoided health and wellbeing loss
	Technical Retrofitting - Low Friction Hull Coating	The economic benefit of applying low friction hull coatings in terms of reduced fuel consumption and ambient air pollutants, and therefore avoided health and wellbeing loss
	Technical Retrofitting – Scrubbing	The economic benefit of installing scrubbers in terms of reducing ambient air pollutants, especially sulphur dioxide and particulates, and therefore avoided health and wellbeing loss
Natural	Air Pollutants	The economic cost of ambient air pollutants generated from fuel consumption in terms of reduced health and wellbeing
	Ballast Water Management	The economic cost of invasive species transferred in treated or untreated ballast water in terms of environmental clean up costs
	Black Water Generation	The economic cost of blackwater generation in terms of treatment costs
	Environmental Incidents	The economic cost of environmental incidents in terms of regulatory administration costs and environmental damage (by severity)
	Grey Water Generation	The economic cost of greywater generation in terms of treatment costs

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Approach | Methodology Overview

Capital	Impact Indicator	Description
Natural	Greenhouse Gas Emissions	The economic cost of greenhouse gas emissions in terms of climate change and the associated discounted loss in global economic output
	Heavy Metals & Base Cations	The economic cost of heavy metals & base cations generated from fuel consumption in terms of reduced health and wellbeing
	Operational Discharges	The economic cost of contamination from cargo lost during unloading or hold cleaning in terms of reduced health and wellbeing
	Particulate Matter	The economic cost of particulate matter generated from fuel consumption in terms of reduced health and wellbeing
	Waste Generated	The economic cost of waste generated in terms of increased CO2e emissions
Social	Community Investment	The economic benefit of community investment in terms of increased wellbeing, cohesion, welfare and education

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Approach I Input Data

- For direct operations, the analysis covers the impacts of 7 ADK managed vessels and 4 CTM managed vessels, referred to as DryLog's owned fleet

- 2019/2020 data was provided by DryLog for the ADK vessels and then extrapolated to the CTM vessels where applicable, exceptions are listed on page 25

- Where the input data was unavailable, values taken from peer reviewed academic literature were used to make robust assumptions for the **Value2**Society analysis

- The four impact indicators where assumed input data was taken from academic literature are:
    - **Ballast Water**
        - 101,719 tonnes of ballast water consumed per year per bulk carrier vessel (Zhang et al., 2014)
    - **Black Water Generation**
        - 34 litres of black water generated per employee per day (Parks et al., 2019)
    - **Grey Water Generation**
        - 170 litres of grey water generated per employee per day (Parks et al., 2019)
    - **Operational Discharges**
        - The volume of metal leaching from different commodities (Lucas and Planner, 2012)
            - Including 6 different elements leaching from coal and 4 elements leaching from 'Other' (assumed to be metal ores)

- Moreover, the inputs reflect the duration the vessels have been part of DryLog's direct fleet for the year 2019/2020. The vessels that were not part of the owned fleet for the full year are:
    - Bulk Bequia (joined on 22/11/2019; 40 operational days)
    - Bulk Geneva (joined on 28/11/2019; 34 operational days)
    - Bulk Mustique (joined on 31/10/2019; 62 operational days)
    - Bulk Patagonia (joined on 04/03/2019; 303 operational days)

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Approach I Input Data

- Several assumptions have been made regarding Drylog's input data. These include:
  - All 214 ship-side employees earn the same monthly wage
  - All 9 shore-side employees earn the same monthly wage
  - The tonnage of cargo that was not coal, was assumed to be metal ores for the operational discharges indicator
  - The financial investment in training and PPE, and the time investment in safety training (drills) was the same for each vessel in both the ADK and CTM managed fleet
  - The frequency and type of drills in 2020 was the same for 2019
  - All vessels have BWMS installed

- The following impact indicators have been evaluated using fuel oil and gas oil consumption data:
  - Air Pollutants
  - Heavy Metals & Base Cations
  - Greenhouse Gas Emissions
  - Particulate Matter

- The number of cases for the Bullying, Discrimination & Harassment (BDH) indicator was set to zero as there were no official reports of bullying in 2019
  - Many bullying, discrimination and harassment cases are unreported
  - According to a Eurofound survey, 20% of employees in the transport and storage sector experience BDH (Eurofound, 2015)
  - This value was used for the competitor values in the benchmarking analysis

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Approach I Input Data: Data Extrapolation

- The majority of the data received from DryLog was based on the 7 ADK managed vessels. The only data received regarding the CTM managed vessels was:
  - Fuel consumption, which was used to calculate Air Pollutants, Heavy Metals & Base Cations, Greenhouse Gas Emissions and Particulate Matter
  - Number of employees per vessel (20)
  - Deadweight tonnage
  - Duration each vessel has been part of the 'owned' fleet

- The remainder of the inputs for the CTM vessels were extrapolated from the ADK vessel data, with the exception of the following, where we were provided with the necessary data inputs:
  - Gross Value Added- Profit, Employment Costs, Tax
  - Investment in Research & Development
  - Investment in Community Investment
  - Shore side impact indicators (i.e. Health & Wellbeing and Vocational Qualifications)

- For the inputs that were extrapolated, this was done in one of two ways:
  - By deadweight tonnage and number of operational days, e.g. Waste Generated; or,
  - Using a unit costs per vessel: e.g. Training & Development, where the data received comprised an annual budget for crew training and PPE expenses per vessel

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Approach I Benchmarking

- Benchmarking input data was collected for 3 dry bulk companies using their public disclosures e.g annual & ESG reports

- The companies are:
  - Eagle Bulk
  - Genco
  - Scorpio Bulkers

- Each item of data extracted from the peer group's public disclosures was reviewed prior to inclusion, in terms of coverage and consistency

- A frequent limitation concerned the scope of a data disclosure. Where data was unavailable relevant proportions taken from the academic literature (e.g. the proportion of employees that experience BDH in the transport and storage sector)

- Unless reported, it has been assumed that all companies use the same mix of fuel and gas oil
  - This is based on an average of DryLog and Eagle Bulk's stated fuel mix

- In order to provide comparisons, absolute performance was normalised against 5 metrics:
  - Deadweight Tonnage (dwt)
  - Revenue (£m)
  - Asset Value (£m)
  - Employment Costs (£m)
  - Number of Employees (#)

- Due to data availability constraints it was only possible to benchmark against 15 **Value2**Society impact indicators
  - See page 12 for impact indicator coverage by organisation

Results

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Results I Direct Operations V2S Headlines: 2019/20 I Divisional Breakdown

- The overall 2019/20 results and key drivers are shown below

DryLog Value2Society Direct Operations [excluding GVA[1]]

€3.82 million [-€6.14 million]

Shore Side [excluding GVA]	**Ship Side** [excluding GVA]
€1.56 million [€0.71 million]	**€2.27 million** [-€6.87 million]

+	Training & Dev. [€0.51 million]	Site Safety [€0.09 million]	Research & Dev. [€0.08 million]	Global Wage [€5.08 million]	Training & Dev. [€1.36 million]	T.R.- Scrubbing [€1.17 million]	+
+	Health Insurance [€0.02 million]	Health&Wellbeing [€0.00 million][2]	Community Inv. [€0.00 million][3]	Optimised Hull [€0.98 million]	T.R.- Hull Coating [€0.49 million]	Other Positives [€0.44 million]	+
				Air Pollutants [-€8.02 million]	Greenhouse Gas [-€3.01 million]	Black Water [-€1.89 million]	−
				Particulate Matter [-€1.59 million]	Grey Water [-€1.18 million]	Other Negatives [-€0.70 million]	−

There are no costs generated from ship side operations in the scope of this analysis

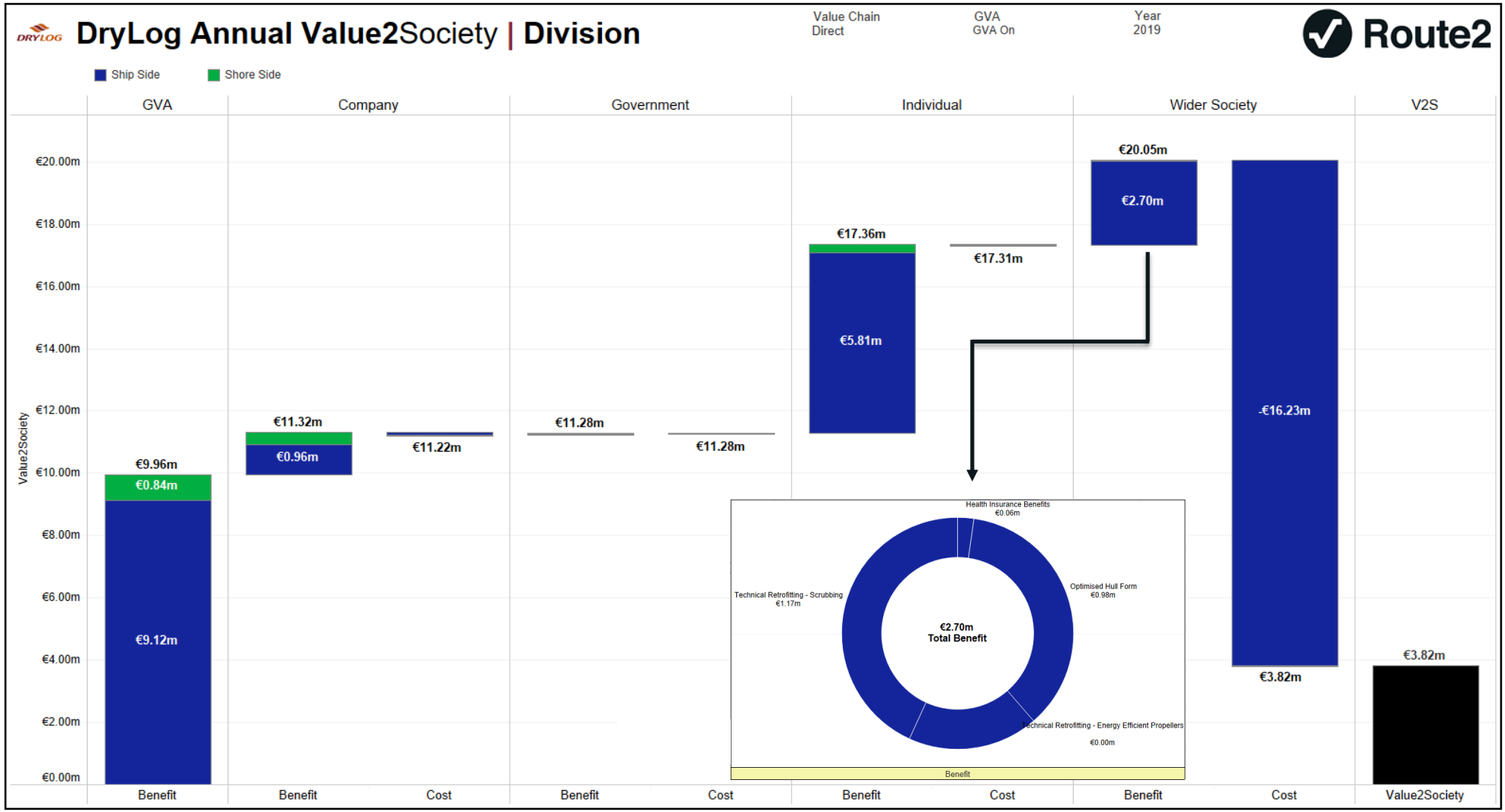
[1] GVA (Gross Value Added) is a traditional measure of economic contribution calculated as the benefit of employee compensation, taxes paid and profit generated

[2] Health&Wellbeing benefit for shore side operations equals €5,878

[3] Community Investment benefit for shore side operations equals €5,146

DryLog Value2Society

Results I Direct Operations V2S Waterfall: 2019/20 I Divisional Breakdown



DryLog Value2Society

Results I Direct Operations V2S Headlines: 2019/20 I Internal vs External

- The direct value can also be split into internal and external value. The results below are at group level

DryLog Value2Society Direct Operations [excluding GVA]	
€3.82 million [-€6.14 million]	
Internal [excluding GVA]	**External** [excluding GVA]
€4.05 million [€1.26 million]	**-€0.07 million** [-€7.40 million]

+	**Training & Dev.** [€1.02 million]	**Site Safety** [€0.19 million]	**Engagement** [€0.07 million]	**Global Wage** [€5.08 million]	**T.R. Scrubbing** [€1.17 million]	**Hull Form** [€0.98 million]	+
+	**Research & Dev.** [€0.06 million]	**Health&Wellbeing** [€0.00 million][1]		**Training & Dev** [€0.84 million]	**T.R. Hull Coating** [€0.49 million]	**Other Positives** [€0.31 million]	+
–	**Turnover** [-€0.09 million]	**Injuries** [-€0.00 million][2]		**Air Pollutants** [-€8.02 million]	**Greenhouse Gas** [-€3.01 million]	**Black Water** [-€1.89 million]	–
				Particulate Matter [-€1.59 million]	**Grey Water** [-€1.18 million]	**Other Negatives** [-€0.59 million]	–

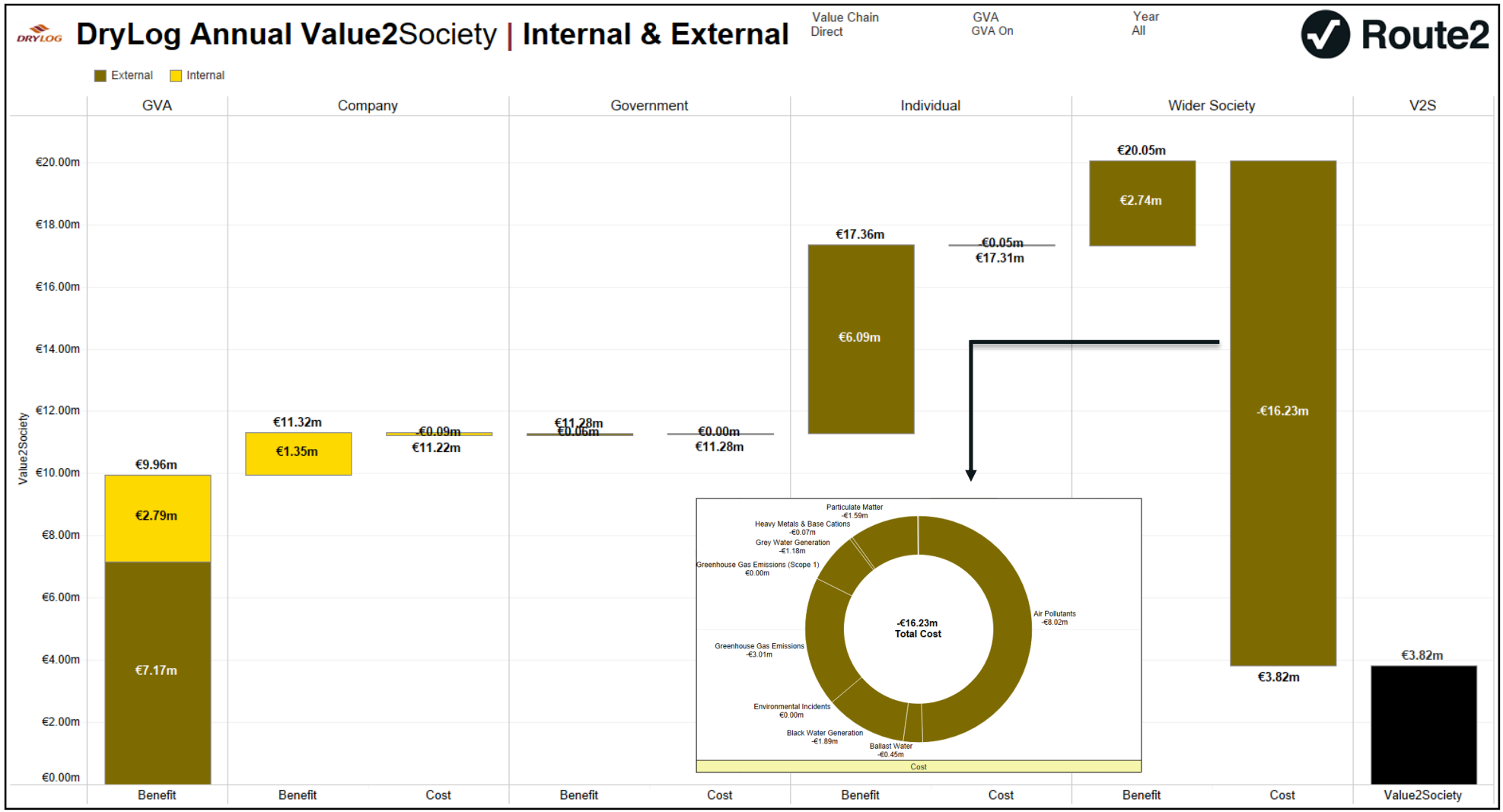
1. Internal wellbeing benefits equal €5,844
2. Internal cost of injuries equal €154

External value can also be split by the stakeholder that experiences the impact

Company	**Government**	**Employees**	**Wider Society**
[€1.26 million]	**[€0.06 million]**	**[€6.04 million]**	**[-€13.34 million]**

DryLog Value2Society

Results I Direct Operations V2S Waterfall: 2019/20 I Internal vs External



DryLog Value2Society

Results I Direct Operations V2S Headlines: 2019/20 I Financial / Non-Financial (Wellbeing)

- The results can also be split into Financial & Wellbeing (i.e. evaluating non-financial costs & benefits in economic terms)

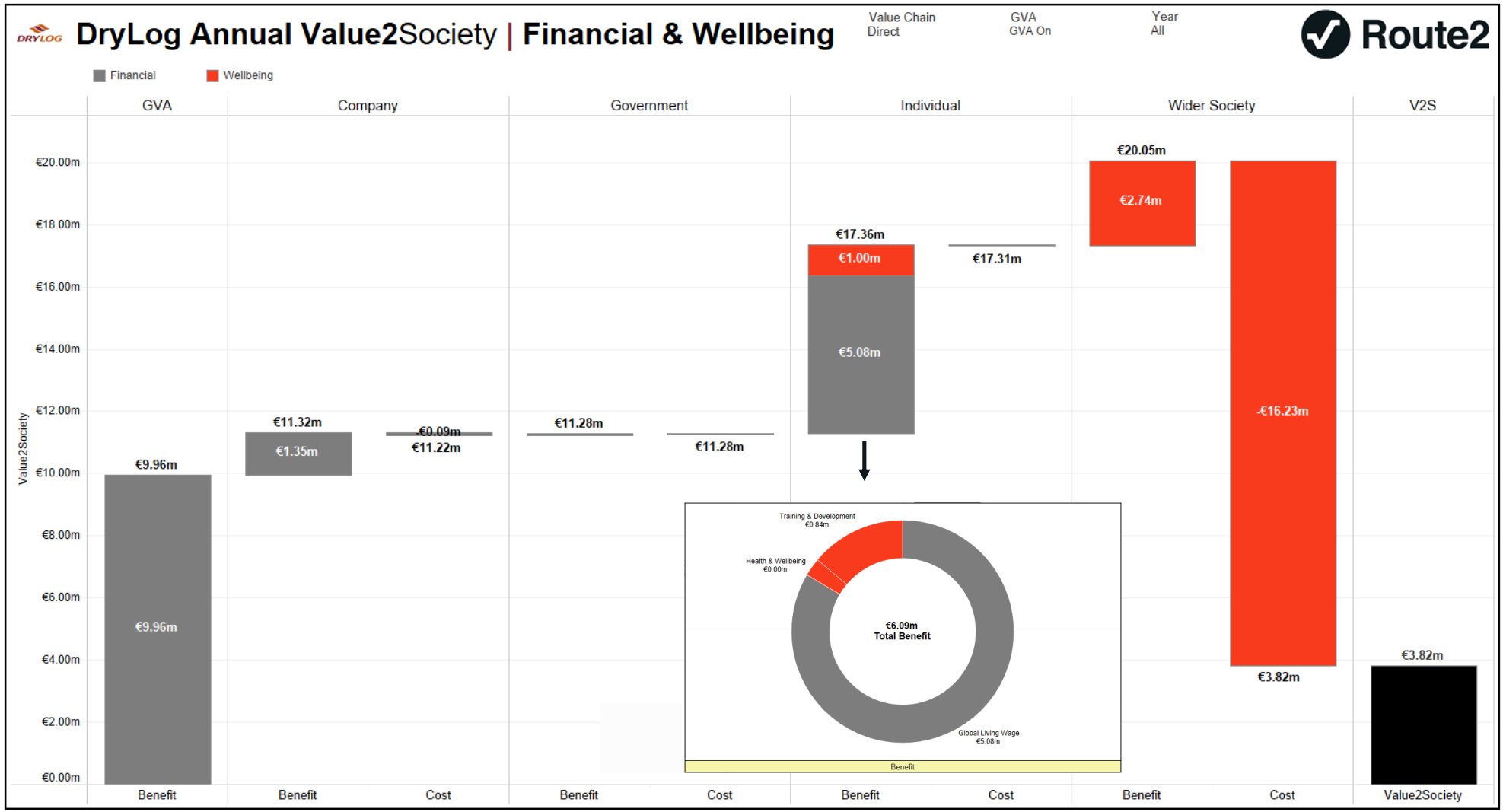
DryLog Value2Society Direct Operations [excluding GVA]	
€3.82 million [-€6.14 million]	
Financial [excluding GVA]	**Wellbeing** [excluding GVA]
€16.36 million [€6.40 million]	**-€12.54 million** [n/a]

	Financial			Wellbeing			
+	Global Wage [€5.08 million]	Training & Dev. [€1.02 million]	Site Safety [€0.19 million]	T.R. Scrubbing [€1.17 million]	Optimised Hull [€0.98 million]	Training & Dev. [€0.84 million]	+
+	Engagement [€0.07 million]	Research & Dev. [€0.06 million]	Other Positives [€0.06 million]	Hull Coating [€0.49 million]	Site Safety [€0.16 million]	Other Positives [€0.10 million]	+
–	Turnover [-€0.09 million]	Injuries [-€0.00 million][1]		Air Pollutants [-€8.01 million]	Greenhouse Gas [-€3.01 million]	Black Water [-€1.89 million]	–
				Particulate Matter [-€1.59 million]	Grey Water [-€1.18 million]	Other Negatives [-€0.59 million]	–

1. The financial cost of injuries equals €772

DryLog Value2Society

Results I Direct Operations V2S Waterfall: 2019/20 I Financial / Non-Financial (Wellbeing)



DryLog Value2Society

Results I Direct Operations V2S Headlines: 2019/20 I Capital Stocks

- The direct value can also be split by capital. The results below are at group level and include GVA

DryLog Value2Society Direct Operations [excluding GVA]

€3.82 million [-€6.14 million]

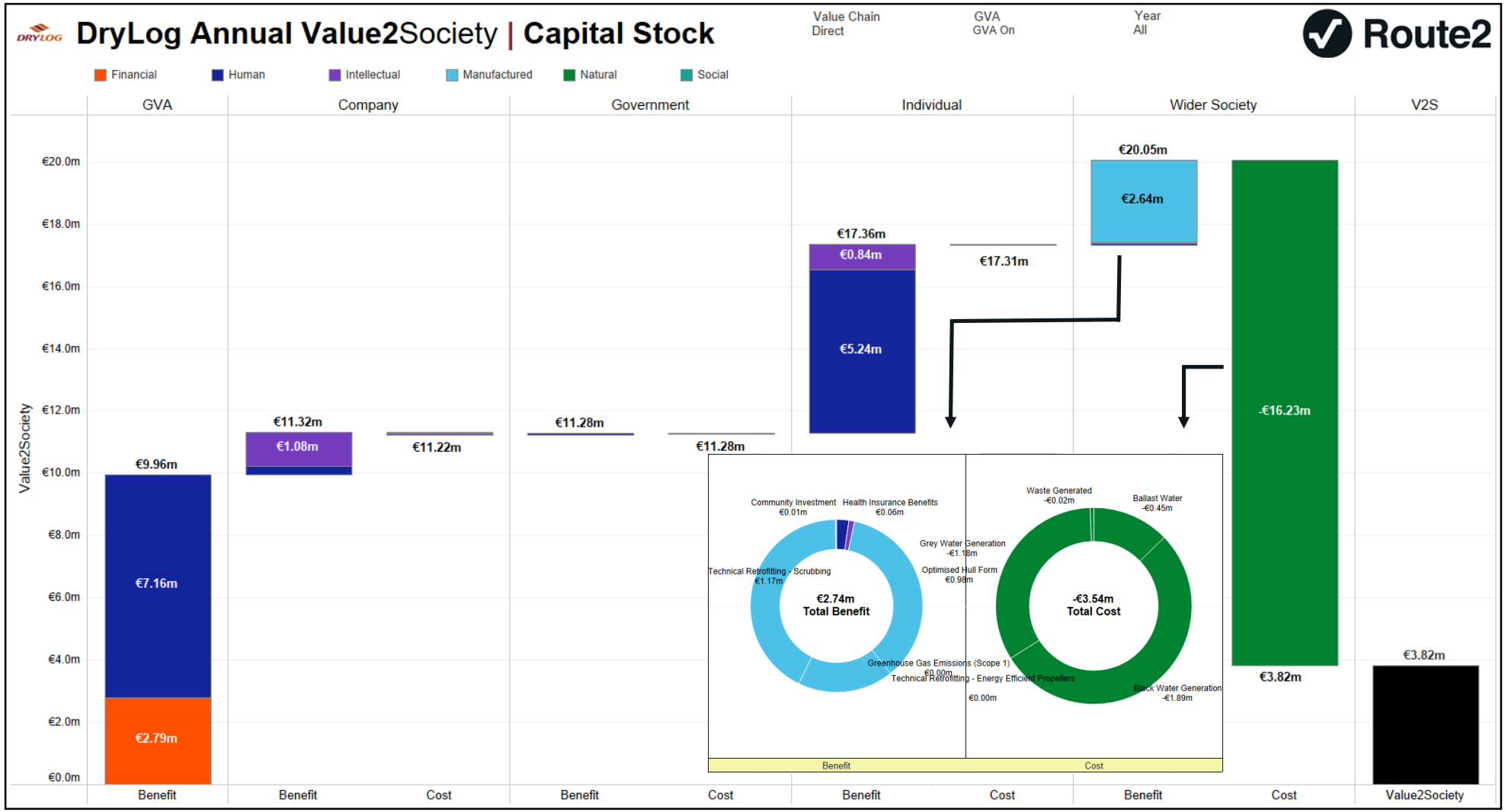
	Financial	Human	Intellectual	Manufactured	Natural	Social	
TOTAL	€2.79 million	€12.80 million	€2.13 million	€1.96 million	-€16.28 million	€0.01 million	TOTAL
+	GVA - Profit €2.79 million	GVA – Staff Costs €7.16 million	Training & Dev. €1.87 million	T.R. Scrubbing €1.17 million		GVA – Tax[1] €0.00 million	+
		+ Global Wage €5.08 million	Research & Dev. €0.08million	Hull Form €0.98 million		Community Inv.[2] €0.00 million	+
		+ Other Positives €0.55 million		Other Positives €0.49 million			
		– Workplace Injuries -€0.00 million[1]	Turnover -€0.09 million		Air Pollutants -€8.02		
					Greenhouse Gas -€3.01		–
					Other Negatives -€5.25		–

[1] GVA - Tax= €7,094
[2] Community Inv.= €5,146

1. The cost of Workplace Injuries equal -€1,157

DryLog Value2Society

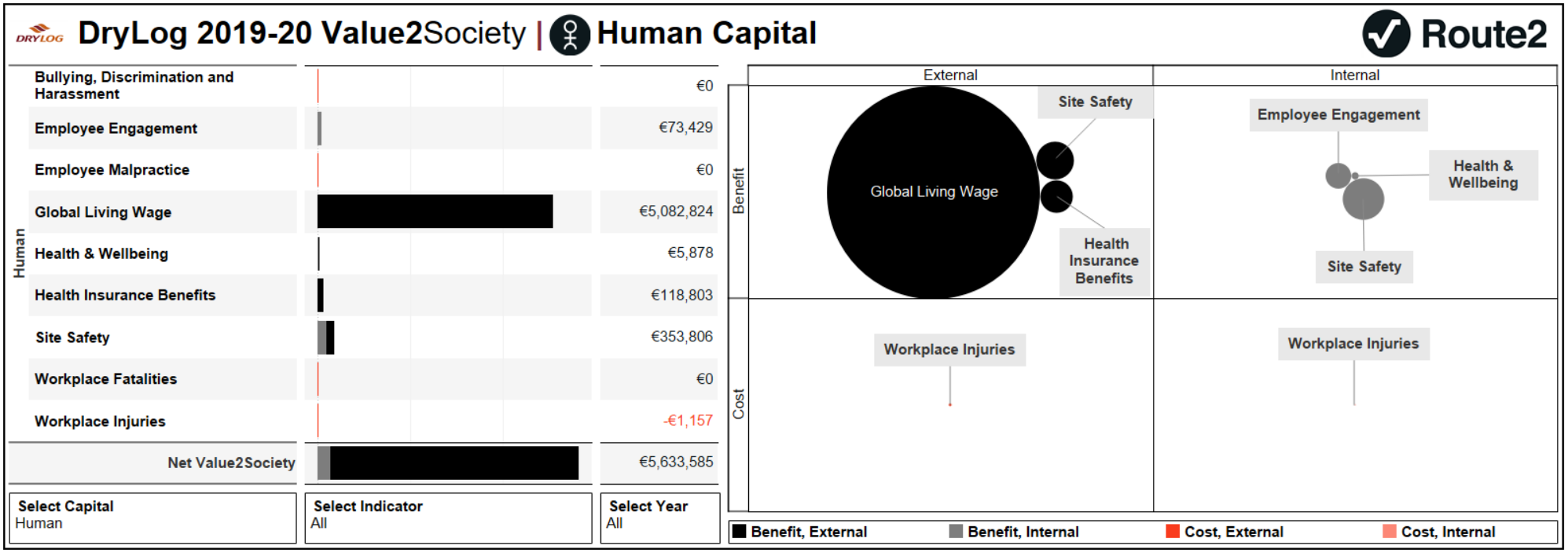
Results I Direct Operations V2S Waterfall: 2019/20 I Capital Stocks



DryLog Value2Society

Results I Direct Operations 2019/20: Human Capital

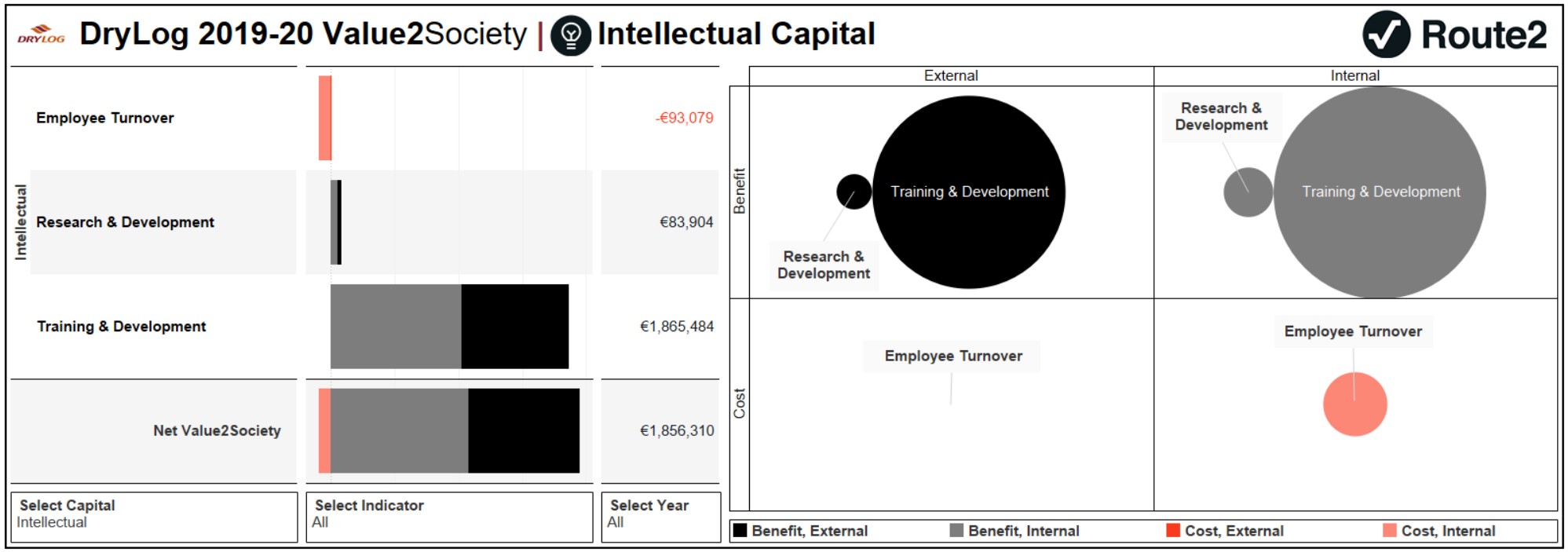
- For direct operations Human Capital is evaluated using 9 impact indicators, **5 positive** & **4 negative**
- Human Capital impacts return an economic benefit of **€5.63 million** (€12.80 million including GVA)
- Global Living Wage stands out as the largest positive driver of improving Human Capital
- The only cost results from Workplace Injuries **(-€1,157),** with there being no recorded incidents of 'bullying', 'employee malpractice', or 'workplace fatalities' (the other three negative impact indicators)



DryLog Value2Society

Results I Direct Operations 2019/20: Intellectual Capital

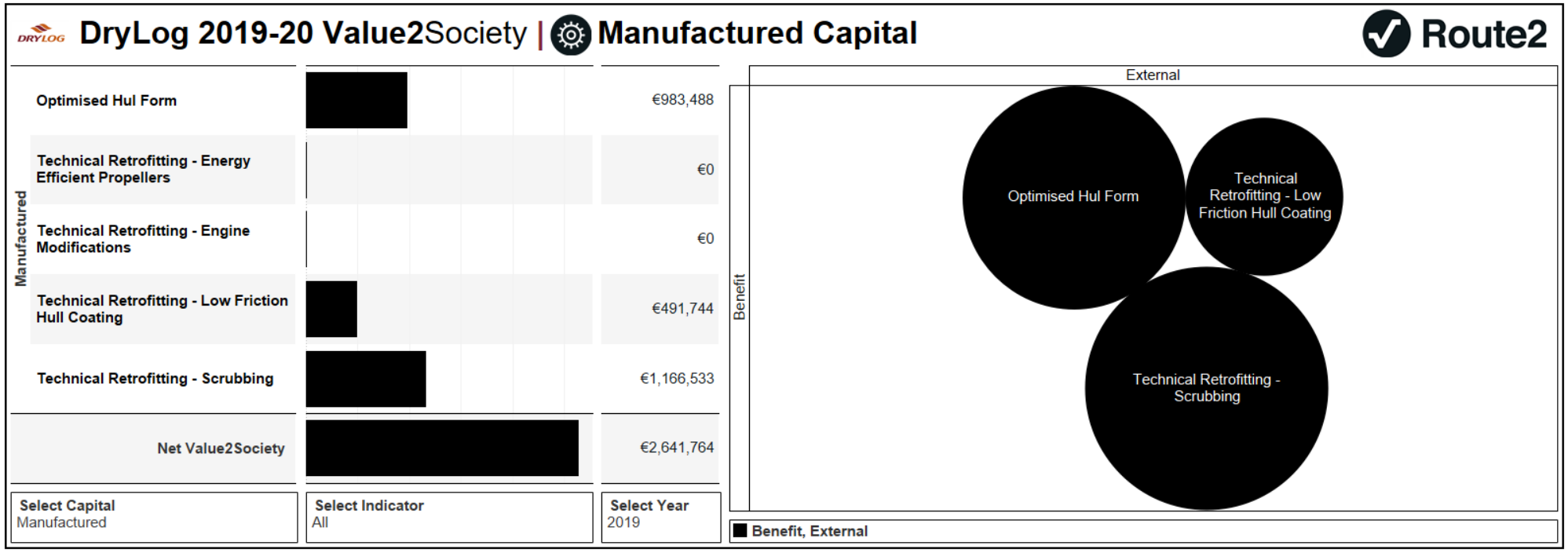
- For direct operations Intellectual Capital is evaluated using 3 impact indicators, **2 positive** & **1 negative**
- Intellectual Capital impacts return an economic benefit of **€1.86 million**
- The result for Intellectual Capital is primarily driven by investment in Training & Development
  - This provides employees with knowledge and skills (external value) resulting in increased productivity for DryLog (internal value)



DryLog Value2Society

Results I Direct Operations 2019/20: Manufactured Capital

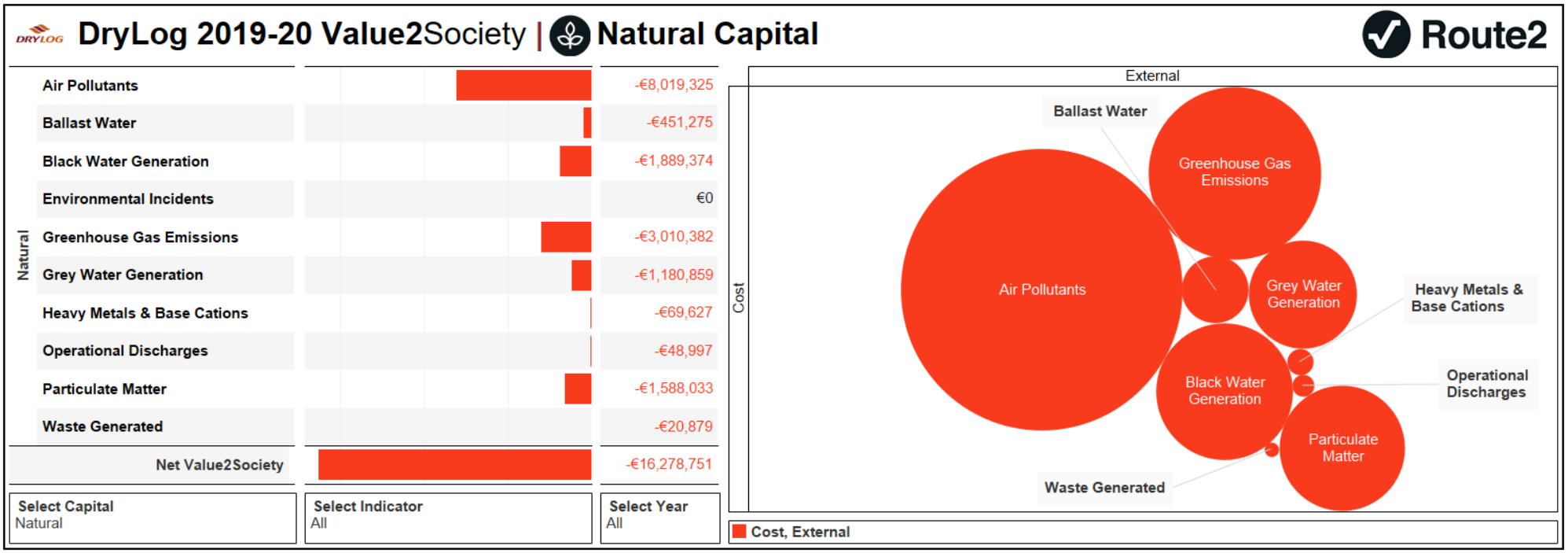
- For direct operations Manufactured Capital is evaluated using 5 impact indicators, **all positive**
- Manufactured Capital impacts return an economic benefit of **€2.64 million**
- The impact indicators are focused on technical retrofitting, and the associated reduction in ambient air pollutants
- The largest benefit is Technical Retrofitting- Scrubbing at **€1.67 million**



DryLog Value2Society

Results I Direct Operations 2019/20: Natural Capital

- For direct operations Natural Capital is described by 10 impact indicators, **all negative**
- Natural Capital impacts return an economic cost of **€16.28 million**
- Air Pollutants incur the highest Natural Capital cost at **€8.02 million**
- These results assume that all vessels will have been fitted with BWMS by the end of 2019

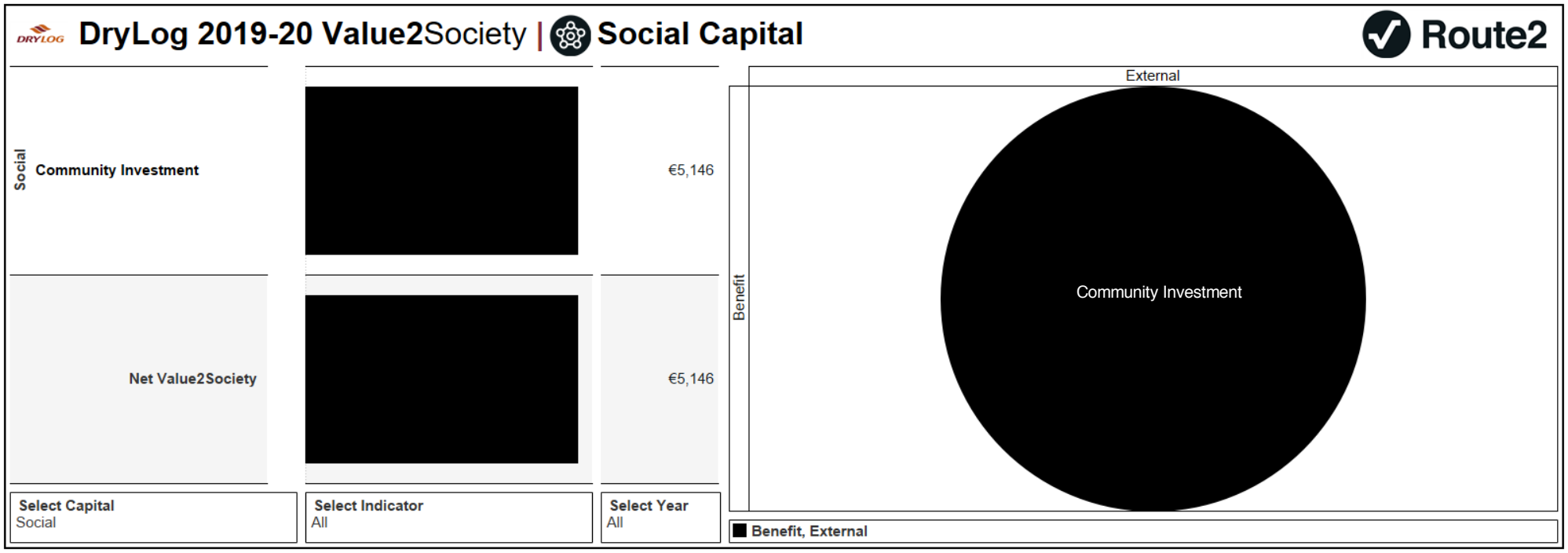


DryLog Value2Society

Results I Direct Operations 2019/20: Social Capital

- For direct operations Social Capital is described by **1 positive** impact indicator
  - Flags of Convenience was a social capital impact indicator included in the first iteration of results but has now been excluded, because DryLog have demonstrated they address the core areas of concern relating to Flags of Convenience (e.g. lack of training & development and poor site safety)

- Social Capital impacts return a net economic benefit of **€5,146**, driven solely by community investment



DryLog Value2Society

Results I ADK and CTM managed Vessels

- The first iteration of DryLog's results only included the data from 7 ADK managed vessels, which generated a **Value2**Society of **€8.34 million**. When the impacts of the 4 CTM managed vessels were added, this decreases the **Value2**Society to **€3.82 million**, predominantly as a result of Air Pollutants, which have increased from - **€3.74 million** to -**€8.02 million.**
    - Appendix A (Page 69) lists the results for all 29 impact indicators

- The following table compares the **Value2**Society of the 7 ADK values to the total 11 vessels (ADK and CTM combined), normalised by megaton of deadweight to provide a more relative comparison
    - The table below (relating to ship side indicators only) shows that per megaton of deadweight, the results do not fluctuate substantially

Indicator Capital	Impact Indicator	ADK V2S Normalised (7 Vessels)	ADK & CTM V2S Normalised (11 Vessels)	Absolute Difference	Percentage Difference
Financial	Gross Value Added - Profit	€ 6,728.267	€ 3,632.010	-€ 3,096.26	-46.02
Human	Bullying, Discrimination and Harassment	€ 0.000	€ 0.000	€ 0.00	0.00
	Employee Engagement	€ 110.401	€ 95.443	-€ 14.96	-13.55
	Employee Malpractice	€ 0.000	€ 0.000	€ 0.00	0.00
	Global Living Wage	€ 7,663.532	€ 6,606.656	-€ 1,056.88	-13.79
	Gross Value Added - Employment Costs	€ 17,248.791	€ 9,311.131	-€ 7,937.66	-46.02
	Health Insurance Benefits	€ 231.461	€ 154.420	-€ 77.04	-33.28
	Safety Programmes	€ 547.631	€ 459.877	-€ 87.75	-16.02

DryLog Value2Society

Results I ADK and CTM managed Vessels

Indicator Capital	Impact Indicator	ADK V2S Normalised (7 Vessels)	ADK & CTM V2S Normalised (11 Vessels)	Difference	Percentage Difference
Human	Workplace Fatalities	€ 0	€ 0	€ 0.00	0.00
	Workplace Injuries	-€ 2	-€ 2	€ 0.03	2.22
Intellectual	Employee Turnover	-€ 140	-€ 121	€ 18.96	13.55
	Training & Development	€ 2,879.135	€ 2,424.757	-€ 454.38	-15.78
Manufactured	Optimised Hull Form	€ 1,106	€ 1,278	€ 172	15.57
	Technical Retrofitting - Energy Efficient Propellers	€ 0	€ 0	€ 0.00	0.00
	Technical Retrofitting - Engine Modifications	€ 0	€ 0	€ 0.00	0.00
	Technical Retrofitting - Low Friction Hull Coating	€ 553	€ 639	€ 86	15.57
	Technical Retrofitting - Scrubbing	€ 1,319	€ 1,516	€ 197.04	14.94
Natural	Air Pollutants	-€ 9,017	-€ 10,424	-€ 1,406.66	-15.60
	Ballast Water	-€ 691	-€ 587	€ 104.91	15.17
	Black Water Generation	-€ 2,274	-€ 2,456	-€ 181.67	-7.99
	Environmental Incidents	€ 0	€ 0	€ 0.00	0.00
	Greenhouse Gas Emissions	-€ 3,370	-€ 3,913	-€ 543.08	-16.12
	Heavy Metals & Base Cations	-€ 79	-€ 91	-€ 11.85	-15.07
	Grey Water Generation	-€ 1,421	-€ 1,535	-€ 113.54	-7.99
	Operational Discharges	-€ 65	-€ 64	€ 1.45	2.22

DryLog Value2Society

Results I ADK and CTM managed Vessels I Introduction

Indicator Capital	Impact Indicator	ADK V2S Normalised (7 Vessels)	ADK & CTM V2S Normalised (11 Vessels)	Difference	Percentage Difference (%)
Natural	Particulate Matter	-€ 1,789	-€ 2,064	-€ 275.38	-15.39
	Waste Generation	-€ 28	-€ 27	€ 0.62	2.22
Social	Gross Value Added - Tax	€ 17.081	€ 9.221	-€ 7.86	-46.02
Total		€ 19,529	€ 4,846	-€ 14,684	-75.19

DryLog Value2 Society

Results I Benchmarking I Introduction

- DryLog's results were benchmarked against Eagle Bulk, Genco and Scorpio Bulkers

- Eagle Bulk's sustainability report is based on requirements set out by the SASB. The main impacts reported (ship side only) relate to Manufactured, Natural and Social capitals. Their report covers:
  - Technical retrofitting to reduce fuel consumption and SOx emissions by 85%
  - Volume of GHG, SOx, NOx, PM emissions
  - Ballast water management system
  - Volunteering opportunities with local charities

- Genco have published an "ESG Initiatives" report which is not based on an existing standard. The main impacts (ship side only) reported relate to Human, Manufactured and Natural capitals. Their report covers:
  - Technical retrofitting to reduce fuel consumption and SOx emissions
  - CO2 emissions (no other greenhouse gases reported)
  - Gender and cultural diversity, and fostering an inclusive working environment

- Scorpio Bulkers' sustainability report is based on the Global Reporting Initiative (GRI) standard. The main impacts reported (ship and shore side) relate to Manufactured, Natural and Social capitals:
  - Technical retrofitting to reduce fuel consumption and associated emissions
  - Fuel consumption and GHG emissions
  - Volume of waste generated from ship side activities and electricity consumption from shore side activities

DryLog Value2Society

Results I Benchmarking

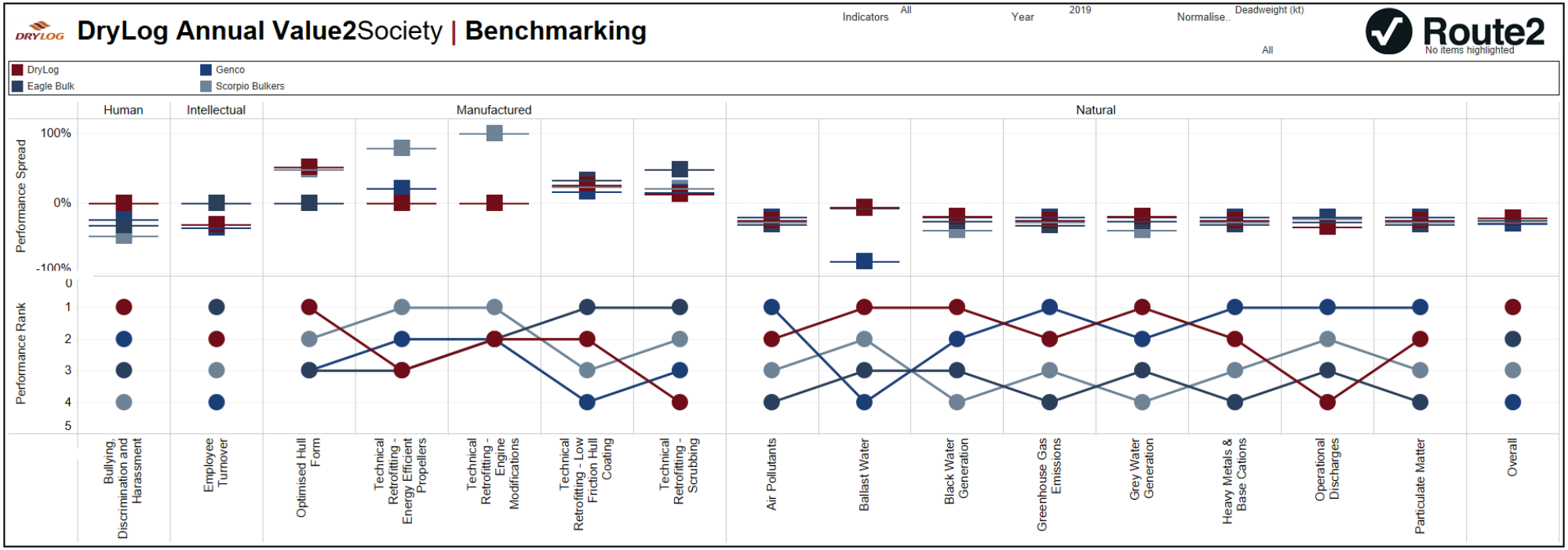
- The full benchmarking results are presented below, normalised by megaton of deadweight
- DryLog performs best in Ballast Water and Optimised Hull Form. This is the primary reason why DryLog is ranked first overall, despite only topping 5 of 15 indicators
- It is also noted that Genco's **Value2**Society would be closer aligned to DryLog's if they increased the proportion of their fleet fitted with Ballast Water Management Systems

Capital	Indicator	DryLog		Eagle Bulk		Genco		Scorpio Bulkers	
		V2S	Rank	V2S	Rank	V2S	Rank	V2S	Rank
Human	Bullying, Discrimination and Harassment	€ 0	1	-€ 1,014	3	-€ 757	2	-€ 1,514	4
Intellectual	Employee Turnover	-€ 137	1	-	-	-€ 140	3	-€ 140	2
Manufactured	Optimised Hull Form	€ 1,278	2	-	-	-	-	€ 1,181	1
	Technical Retrofitting - Energy Efficient Propellers	€ 0	3	-	-	€ 162	1	€ 591	2
	Technical Retrofitting - Engine Modifications	€ 0	2	-	-	-	-	€ 195	1
	Technical Retrofitting - Low Friction Hull Coating	€ 639	2	€ 815	1	€ 431	4	€ 591	3
	Technical Retrofitting - Scrubbing	€ 1,516	4	€ 5,393	1	€ 1,765	3	€ 2,406	2
Natural	Air Pollutants	-€ 10,424	2	-€ 13,309	4	-€ 8,519	1	-€ 11,647	3
	Ballast Water	-€ 587	1	-€ 696	3	-€ 8,860	4	-€ 588	2
	Black Water Generation	-€ 2,456	1	-€ 3,352	2	-€ 2,504	3	-€ 5,006	4
	Greenhouse Gas Emissions	-€ 3,913	2	-€ 5,109	3	-€ 3,239	1	-€ 4,438	4
	Grey Water Generation	-€ 1,535	1	-€ 2,095	3	-€ 1,565	2	-€ 3,129	4
	Heavy Metals & Base Cations	-€ 91	2	-€ 113	4	-€ 73	1	-€ 100	3
	Operational Discharges	-€ 64	4	-€ 49	3	-€ 37	1	-€ 42	2
	Particulate Matter	-€ 2,064	2	-€ 2,612	4	-€ 1,678	1	-€ 2,292	3
Total		-€ 17,838	2.0	-€ 22,141	2.8	-€ 25,014	2.1	-€ 23,932	2.7

DryLog Value2Society

Results I Benchmarking

- A second visualisation of the benchmarking results is provided below
- This reinforces that DryLog is ranked first for 5 of the 15 impact indicators, second for 7, third for 1 and fourth in 2
- Generally there is little spread between the companies, except Genco's relative performance in Ballast Water and Scorpio Bulker's relative performance in Technical Retrofitting- Engine Modifications



Insights

DryLog Value2 Society

Insights | Key Value Drivers

- Beyond GVA, the main positive drivers of 2019/20 DryLog direct **Value2**Society **shore-side** are:
  - Training & Development €0.51m
  - Site Safety €0.09m
  - Research & Development €0.08m
  - Health Insurance Benefits €0.02m
  - Health & Wellbeing €5,878

- Beyond GVA, the main positive drivers of 2019/20 DryLog direct **Value2**Society **ship-side** are:
  - Global Living Wage €5.08m
  - Training & Development €1.36m
  - Technical Retrofitting- Scrubbing €1.17m
  - Optimised Hull Form €0.98m
  - Technical Retrofitting- Hull Coating €0.49m

- The largest negative drivers of 2019/20 DryLog direct **Value2**Society **ship-side** are:
  - Air Pollutants -€8.02m
  - Greenhouse Gas Emissions -€3.01m
  - Black Water Generation -€1.89m
  - Particulate Matter -€1.59m
  - Grey Water Generation -€1.18m

- DryLog ranked first in benchmarking analysis for the following 5 impact indicators:
  - Black Water Generation -€2,456 per kiloton of deadweight
  - Grey Water Generation -€1,535 per kiloton of deadweight
  - Ballast Water -€587 per kiloton of deadweight
  - Bullying, Discrimination & Harassment €0 per kiloton of deadweight
  - Optimised Hull Form €1,278 per kiloton of deadweight

DryLog Value2 Society

Insights | Key Value Drivers

- By understanding the magnitude of different impacts, DryLog will be able to strategically identify interventions that will generate the largest net economic benefit, especially those related to air pollution, such as SO_2 and Particulate Matter
    - Air Pollutants (including SO_2) generate DryLog's largest cost, estimated at -€8.02 million

- This is of growing importance as the World Health Organization have estimated that almost 7 million deaths annually are caused from ambient air pollution (WHO, 2020). Moreover, Particulate Matter (PM) concentrations from shipping are estimated to be responsible for approximately 60,000 deaths annually (Corbett et al., 2007)

- As of 2019, about 27% of DryLog's Fuel Oil consumption passed through scrubbers (three out of the eleven vessels in DryLog's direct fleet have installed scrubbers)

- Installing scrubbers reduces SO_2 emissions by 95% and Particulate Matter emissions by 60%. Therefore installing scrubbers on the three vessels has reduced their SO_2 emissions from 343 tonnes to 17 tonnes and PM emissions from 103 tonnes to 41 tonnes
    - These values are calculated from emission factors by the National Atmospheric Emissions Inventory, based on fuel consumption
    - It is this reduction in SO_2 and PM emissions that has resulted in the benefit of €1.17 million reported
    - Although the main advantage of installing scrubbers is a reduction in SOx emissions, PM emissions are also reduced

- Installing scrubbers across the entire DryLog fleet so that 100% of Fuel Oil passes through scrubbers, would reduce SO_2 emissions from 1,199 tonnes to 60 tonnes and PM emissions from 460 tonnes to 144 tonnes
    - This would generate a **Value2**Society of €4.08 million as opposed to the €1.17 benefit from having only about three vessels with this technical retrofit

- Moreover, if all eleven vessels had scrubbers installed this would offset the current cost generated by Air Pollutants from -€8.02 million to -€3.94 million. In addition, this would inflate DryLog's current **Value2**Society from €3.82 million to €7.90 million

DryLog Value2 Society

Insights | Key Value Drivers

- Another example is the Technical Retrofitting of Energy Efficient Propellors or Engine Modifications

- Research by the European Commission finds that on average:
  - Energy Efficient propellors reduce fuel consumption by ~6%. Therefore, the societal costs of Air Pollutants, Greenhouse Gas Emissions, Heavy Metals & Base Cations and Particulate Matter associated with the fuel consumed are also reduced by ~6%
  - Engine Modifications reduce fuel consumption by ~2% and consequently the costs of Air Pollutants, Greenhouse Gas Emissions, Heavy Metals & Base Cations and Particulate Matter associated with the fuel consumed are also reduced by ~2%

- In 2019, no vessels in DryLog's direct fleet had either installed. However, the analysis found that if all eleven vessels were fitted with Energy Efficient Propellors and Engine Modifications, then the **Value2**Society would be €0.49 million and €0.16 million, respectively
  - This is calculated in terms of avoided Air Pollutants, Greenhouse Gas Emissions, Heavy Metals & Base Cations and Particulate Matter
  - The economic benefit of Energy Efficient Propellors is about 3 times larger than that of Engine Modifications, simply because of the amount of fuel consumption (and the consequent ambient air pollution) that is reduced

- Comparison across the Technical Retrofitting indicators finds that installing scrubbers yields significantly higher benefits than the other three options due to the high environmental cost of sulphur dioxide (SO_2)

DryLog Value2 Society

Insights I Key Value Drivers

- Moreover, it was assumed that all eleven of DryLog's vessels have ballast water management systems (BWMS) installed
  - Without BWMS DryLog's annual cost to society of introducing invasive species would be up to -€20.04 million compared to -€0.45 million. **Value2**Society therefore demonstrates the significant benefit of installing BWMS
  - It should be noted that BWMS are not 100% effective, and therefore a societal cost is still incurred, albeit significantly reduced
  - This is calculated in terms of clean up costs associated with managing and removing the introduced invasive species

- Another large benefit (both internal and external) generated from DryLog's direct operations is Training & Development
  - Each crew member spends an average of 40 hours per annum participating in safety drills in addition to other training activities
  - This refutes one of the criticisms of flying a FoC, which is that employees receive little to no training which can increase the frequency of accidents

- Other criticisms associated with flying FoCs are that employees receive no healthcare insurance and low wages, however earning a Global Living Wage and Health Insurance Benefits comprise some of DryLog's largest Human Capital benefits; **€5.08 million** and **€0.12 million,** respectively
  - About 90% of DryLog's crew are form the Philippines and the remaining 10% are from the Ukraine
  - Crew members from the Philippines earn about 3.4 times the respective national wage and crew members from the Ukraine earn about 1.1 times the respective national wage

- DryLog ranks second in Greenhouse Gas Emissions, and is out ranked by Genco by a small margin. The predominant reason being that Genco have retrofitted 35% of their fleet with Energy Efficient Propellors

- The normalised values of Greenhouse Gas Emissions per kiloton of deadweight are:
  - Genco -€3,672
  - DryLog -€3,913
  - Eagle Bulk -€5,109
  - Scorpio Bulkers -€8,849

DryLog Value2 Society

Insights I Key Value Drivers

- The IMO have adopted mandatory measures to reduce Greenhouse Gas Emissions, known as the IMO GHG Strategy, which is broken into short, medium and long term measures

- Part of the short term targets set by the IMO are improvements in the Energy Efficiency Design Index (EEDI) by 20%, and the Ship Energy Efficiency Management Plan (SEEMP), which are brought about with technical enhancements
    - The installation of the different technical retrofittings across the entire fleet, would reduce the value of DryLog's greenhouse gases by ~23%
    - This suggests that a full and comprehensive retrofit of all vessels will only enable the Maritime Transport sector to meet the short term IMO targets

- The medium term and long terms goals of the IMO are to reduce CO2 emissions by 40% for 2023-2030 and 50% by 2050, respectively
    - To meet these goals, the research and analysis suggests that the Maritime Transport sector needs to move beyond retrofitting and explore next generation eco-friendly fuel propulsion ships (Joung et al., 2020)

- RightShip analysis confirms that fleet efficiency rates do not always increase over time and improvements do not solely correlate with engine power – they are also influenced by hull design, vessel design, vessel size, in addition to the type of fuel consumed
    - **Value2**Society provides the platform to optimise capital expenditure in the context of the GHG reduction pathways being imposed on the Maritime Transport sector

Conclusions

DryLog Value2 Society

Summary I Highlights

- This project demonstrates that **Value2**Society can provide new insight on sustainability performance for DryLog and the Maritime Transport sector
    - The analysis highlights that Air Pollutants from DryLog's direct operations incur the highest cost to society and that installing scrubbers on the entire fleet would drive down this cost significantly

- One year of DryLog data (2019/20) has been used to quantify the **Value2**Society of its **direct** operations for 7 ADK managed vessels and 4 CTM managed vessels
    - Where data was unavailable, values from peer reviewed academic literature were used
    - Values used for the CTM managed vessels were extrapolated from the ADK managed vessels

- DryLog generates a net **Value2**Society from its **direct operations** for 2019/20 of **€3.82 million** (including GVA – an established measure of economic contribution which includes taxes paid, employment costs and profit)

- In 2019/20 DryLog **direct operations** from **shore-side** activities generated **€1.56 million** of benefits and **ship-side** activities generated **€2.27 million** of benefits

- Combined, shore-side and ship-side generated an economic costs of -**€0.23 million** relating to stakeholders external to the company (including employees).
    - Air Pollutants generate the highest cost for DryLog's direct operations by a large margin [-**€8.02 million**]. This is almost 2.7 times larger than the cost of Greenhouse Gas Emissions [-**€3.01 million**].

- When **normalised by deadweight tonnage** DryLog performs better than the 3 peer companies it was benchmarked against and comes top in 5 of the 15 impact indicators analysed

DryLog Value2Society

Summary I Key Costs and Benefits

- A selection of positive and negative impact indicators have been used to evaluate the enhancement and erosion of the capital stocks (financial, manufactured, human, intellectual, natural and social capital) upon which DryLog relies

Key Costs

- Key costs for ship-side activities within **direct operations** relate to Air Pollutants [-**€8.02 million**], Greenhouse Gas Emissions [-**€3.01 million**] and Black Water Generation [-**€1.89 million**]

- The costs of DryLog **Value2**Society are driven by ship-side operations [-**€16.37 million**] with the highest impacted stakeholder group being wider society [-**€16.23 million**]

Key Benefits (exc. GVA)

- Key benefits for shore-side activities within **direct operations** result from Training & Development [**€0.51 million**], Site Safety [**€0.09 million]** and Research & Development [**€0.08 million**]

- Key benefits for ship-side activities within **direct operations** relate to Global Living Wage [**€5.08 million]**, Training & Development [**€1.36 million**] and Technical Retrofitting- Scrubbing [**€1.17 million**]

- The benefits of Drylog **Value2**Society are predominantly driven by ship-side operations [**€9.52 million**] compared to shore-side operations [**€0.71 million**]

- The majority of the benefits relate to DryLog's employees [**€6.09 million**], further highlighting that despite carrying a FoC, DryLog is addressing the associated employee-related concerns

DryLog Value2Society

Limitations & Opportunities I

There are a number of opportunities to enhance the **Value2**Society project:

1. Validation and Resolution of Inputs
   - Several CTM vessel inputs are based on the values used for ADK vessels (e.g. time investment in Training & Development) Obtaining the exact information would strengthen the results, and improve the accuracy of the benchmarking analysis
   - Data at ship level resolution would enable the identification of increased efficiencies from outperforming vessels, which could then be implemented across the fleet
2. Additional Years
   - Analysing previous and future years will enable trend analysis, surfacing the direction of travel for each impact indicator
   - Establish a performance baseline and set **Value2**Society orientated targets (and align with the IMO's GHG 2050 goals)
3. Additional Impact Indicators
   - Introduce a more comprehensive and balanced (positive/negative) selection of impact indicators to ensure coverage across all capitals and other pertinent Maritime Transport sector issues
4. Impact Indicator Improvements
   - E.g. Updating the operational discharges impact indicator to reflect the effects associated with grain commodities
   - E.g. Where relevant breaking down the ship-side analysis into sea-side and port-side impacts. This has only been done for the operational discharges impact indicator
   - It is recommended that new publications are reviewed annually to establish where the latest academic research should be incorporated into any of the impact indicator methods
5. Autonomous Tool
   - The **Value2**Society framework can be systemised into an autonomous performance management and decision making tool enabling DryLog to take independent ownership of future calculations if desired
6. Value Chain
   - Beyond the current coal and grain case studies, extend the analysis to include a comprehensive assessment of Drylog's upstream and downstream impacts

DryLog Value2 Society

Concluding Remarks I

- **Value2**Society will enable DryLog to transition to being a more valued and valuable company

- Using a set of 29 impact indicators and based on a number of input data assumptions, this project has demonstrated the potency and scalability of the **Value2**Society framework for delivering DryLog's sustainability objectives

- The full and comprehensive application of **Value2**Society will provide DryLog with first mover advantage in the Maritime Transport sector, as it adapts to evolving stakeholder demands

- Understanding the economic costs and benefits calculated in **Value2**Society will be of growing importance as regulatory changes relating to security, business ethics, health and safety, and labour standards will place additional pressure on Maritime Transport companies to increase sustainability performance

- The **Value2**Society framework will enable DryLog to effectively integrate sustainability into decision making processes, and surface the linkages between societal impacts and financial performance

Case Studies

DryLog Value2Society

Case Studies I Overview

- For the 'enabled' analysis, two example commodity value-chain impacts were assessed and evaluated – coal & grain
    - Positive & negative impacts across production (upstream) & consumption (downstream)
        - Shipping being the value chain link

- The table below details the impacts assessed and evaluated, with their associated values

		Coal (€M)	Grain (€M)	Combined (€M)
Upstream	Employment	1.501	3.131	2.451
	Injuries	(0.005)	(0.006)	(0.011)
	Fatalities	(0.012)	(0.011)	(0.023)
	Water Consumption	(0.014)	(1.269)	(1.283)
	GHG Emissions	(0.401)	(0.463)	(0.864)
Downstream	Product Benefits	6.315	6.772	13.087
	Water Consumption	(0.062)	(0.152)	(0.215)
	GHG Emissions	(2.448)	(0.231)	(2.680)
Total		**4.874**	**7.770**	**12.644**

- **The total Value2society attributable to Drylog is calculated using the total tonnage of each commodity shipped by Drylog and the proportion of the commodities final sale price attributable to sea freight; coal (6%) (IEA,2018) and grain (3%) (Schnepf, 2015)**

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Case Studies I Coal – Upstream (Production): Costs

- Upstream costs include fatalities & injuries; resulting in individual non-financial (wellbeing) costs as well as water consumption and climate change contribution associated with CO2e emissions from coal mining; resulting in wider society non-financial costs

- The individual non-financial (wellbeing) cost associated with fatalities & injuries is calculated based on UK Government HSE appraisal values which suggest a human cost of £10,015 per workplace injury and £1,203,000 per workplace fatality. The human cost of a workplace injury is based on the average cost for 'up to 6 days absence' and '7 or more days absence' as injury length is not specified

- The wider society non-financial cost associated with water consumption is calculated based on research by Overton (2020) which suggests 6.53 M3 of water is consumed per tonne of coal mined. The volume of water consumed per tonne of coal is multiplied by the replacement cost of water (£1.18/M3) and the total volume of coal

- The wider societal non financial cost associated with CO2e emissions, in terms of contribution to climate change, is calculated using emissions factors published by the UK government (2020) which suggest 0.4 tonnes of CO2e is released per tonne of coal mined. The emissions factors are multiplied by total tonnes of coal and the social cost of carbon ($80) (Pindyck, 2018)

DryLog Value2 Society

Case Studies I Coal – Upstream (Production): Benefits

- Upstream benefits include employment; resulting in individual financial and non-financial (wellbeing) benefits and wider society financial benefits in terms of local economic development

- The individual financial benefit associated with employment is calculated based on average annual salary data published by the International Labour Organisation (2018). The annual salary is dependant on sector and country

- The individual non-financial (wellbeing) benefit associated with employment is calculated using a welfare weight (2.0) published by the UK government (2017). The multiplier is applied to the above individual financial benefit, to reflect the individual wellbeing benefit associated with employment

- The wider society financial benefit associated with employment is calculated using a local economy multiplier (1.6) published by the UK government (2017). The multiplier is applied to the above individual financial benefit, to reflect the economic development benefit associated with employment

DryLog Value2 Society

Case Studies I Coal – Downstream (Consumption): Costs

- Downstream costs include deaths due to CO2e emissions produced as a by-product of coal consumption; resulting in individual non-financial (wellbeing) costs and water consumption and climate change contribution associated with CO2e emissions from coal consumption; resulting in wider society non-financial costs

- The wider society non-financial cost associated with CO2e emissions, in terms of contribution to climate change, is calculated using emissions factors published by the UK government (2020) which suggest 2.2 tonnes of Co2e is released per tonne of coal used for electricity generation and 2.4 tonnes of CO2e is released per tonne of coal used for industrial purposes. The emissions factors are multiplied by the total tonnes of coal (by activity) and the social cost of carbon ($80) (Pindyck, 2018)

- The individual non-financial (wellbeing) cost associated with death is calculated by multiplying the number of deaths associated with CO2e emissions from coal consumption by the total volume of coal and the Value Statistical Life Year, global average (£28,880)

- The wider society non-financial cost associated with water consumption is calculated based on research by Overton (2020) which suggests 1.25 M3 of water is consumed per MWh of electricity generated. The volume of water consumed per MWh of electricity is multiplied by the total MWh of electricity generated per tonne of coal, the total volume of coal and the replacement cost of water (£1.18/M3)

DryLog Value2 Society

Case Studies I Coal – Downstream (Consumption): Benefits

- Downstream benefits include avoided wellbeing loss associated with coal as a source of electricity, in terms of avoided energy poverty; resulting in wider societal non-financial benefits

- The wider societal wellbeing benefit is calculated using research by Thomson (2017) which explores the relationship between mental illness (anxiety/depression) and energy poverty by comparing individuals in energy poor homes (homes with inadequate energy services) compared to those not. The prevalence of mental illness among individuals in energy poor homes is expressed as an odds ratio (OR). Odds ratios reflect the risk of anxiety/depression due to energy poverty (OR = 1.91)

- The increased rate of mental illness caused by energy poverty is calculated by multiplying the prevalence of mental illness in the population (15%) by the increased likelihood of mental illness among individuals in energy poverty. This value is then multiplied by the disability weight for moderate anxiety/depression (0.26) and Value of Statistical Life Year to calculate the avoided wellbeing cost

- A disability weight is a quantitative factor that reflects the severity of an illness on a scale of 0 (perfect health) to 1 (death). Disability Weights are specific to both the illness, injury or disease and to the severity of the illness etc. A disability weight associated with moderate anxiety/depression of 0.26 was used throughout this methodology

- A Value Statistical Life Year is the ratio of the amount of money an individual would give up in exchange for a small reduction in mortality risk multiplied by the average life expectancy of the individual. This is a value used by governments and international bodies to appraise health related interventions. The VSLY global average is £28,880

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Case Studies I Grain – Upstream (Production): Costs

- Upstream costs include fatalities & injuries; resulting in individual non-financial (wellbeing), as well as water consumption, eutrophication potential and climate change contribution associated with CO2e emissions from farming activity and processing of grain; resulting in wider society non-financial costs

- The individual non-financial (wellbeing) cost associated with fatalities & injuries is calculated based on government HSE appraisal values which suggest a human cost of £10,015 per workplace injury and £1,203,000 per workplace fatality. The human cost of a workplace injury is based on the average cost for 'up to 6 days absence' and '7 or more days absence' as injury length is not specified

- The wider society non-financial cost associated with water consumption is calculated using life cycle data published by Oxford University (2018). The volume of water consumed per kg of grain is multiplied by the replacement cost of water (£1.18/M3) and the total volume of grain. The volume of water consumed is dependant on grain type and country

- The wider society non-financial cost associated with eutrophication is calculated using life cycle data published by Oxford University (2018). The eutrophication potential is multiplied by the environmental cost of eutrophication (£1.35/Kg) (Delft, 2018) and the total volume of grain. The eutrophication potential is dependant on grain type and country

- The wider society non-financial cost associated with CO2e emissions, in terms of contribution to climate change, is calculated using life cycle data published by Oxford University (2018). Tonnes of CO2e emissions are multiplied by total volume of grain and social cost of carbon ($80) (Pindyck, 2018)

DryLog Value2 Society

Case Studies I Grain – Upstream (Production): Benefits

- Upstream benefits include employment; resulting in individual financial and non-financial (wellbeing) benefits and wider society financial benefits in terms of local economic development

- The individual financial benefit associated with employment is calculated based on average annual salary data published by the International Labour Organisation (2018). The annual salary is dependant on sector and country

- The individual non-financial (wellbeing) benefit associated with employment is calculated using a welfare weight (2.0) published by the UK government (2017). The multiplier is applied to the above individual financial benefit, to reflect the individual wellbeing benefit associated with employment

- The wider society financial benefit associated with employment is calculated using a local economy multiplier (1.6) published by the UK government. The multiplier is applied to the above individual financial benefit, to reflect economic development benefit due to employment

DryLog Value2 Society

Case Studies I Grain – Downstream (Consumption): Costs

- Downstream costs include water consumption, eutrophication potential and climate change contribution associated with CO2e emissions from transportation, storage, packaging, retail and loss of grain; resulting in wider society non-financial costs

- The wider society non-financial cost associated with water consumption is calculated using life cycle data published by Oxford University (2018). The volume of water consumed per kg of grain is multiplied by the replacement cost of water (£1.18/M3) and the total volume of grain. The volume of water consumed is dependant on grain type and country

- The wider society non-financial cost associated with eutrophication is calculated using life cycle data published by Oxford University (2018). The eutrophication potential is multiplied by the environmental cost of eutrophication (£1.35/Kg) (Delft, 2018) and the total volume of grain. The eutrophication potential is dependant on grain type and country

- The wider society non-financial cost associated with CO2e emissions, in terms of contribution to climate change, is calculated using life cycle data published by Oxford University (2018). Tonnes of CO2e emissions are multiplied by total volume of grain and social cost of carbon ($80) (Pindyck, 2018)

DryLog Value2 Society

Case Studies I Grain – Downstream (Consumption): Benefits

- Downstream benefits include avoided wellbeing loss associated with grain as a food source in terms of avoided hunger; resulting in wider societal non-financial benefits

- The wider societal wellbeing benefit is calculated using research by Godecke (2019) which uses Disability Adjusted Life Years (DALYs) to quantify burden of hunger

- DALYs account for the severity of health conditions and quantify the health burden by measuring the number of healthy life years lost due to disability and premature death. As hunger negatively affects people's functioning, the burden of hunger calculated with DALYs offers a meaningful way to measure this loss of functioning

- The method assumes that the consumption of grain results in avoided hunger and thus avoided DALYs, resulting in a wellbeing benefit. The avoided DALYs are multiplied by the total tonnes of grain, the proportion of grain used for human consumption and the Value Statistical Life Year, global average (£28,880)

Appendices

DryLog Value2Society

Appendix A | Results for all 29 Impact Indicators

Capital	Impact Indicator	Year	Shore Side	Ship Side	Total
Financial	Gross Value Added - Profit	2019	€ 139,714	€ 2,654,569	€ 2,794,283
Human	Bullying, Discrimination and Harassment	2019	€ 0	€ 0	€ 0
	Employee Engagement	2019	€ 0	€ 73,429	€ 73,429
	Employee Malpractice	2019	€ 0	€ 0	€ 0
	Global Living Wage	2019	€ 0	€ 5,082,824	€ 5,082,824
	Gross Value Added - Employment Costs	2019	€ 701,453	€ 6,462,056	€ 7,163,509
	Health & Wellbeing	2019	€ 5,878	€ 0	€ 5,878
	Health Insurance Benefits	2019	€ 16,244	€ 102,559	€ 118,803
	Site Safety	2019	€ 94,656	€ 259,150	€ 353,806
	Workplace Fatalities	2019	€ 0	€ 0	€ 0
	Workplace Injuries	2019	€ 0	-€ 1,157	-€ 1,157
Intellectual	Employee Turnover	2019	€ 0	-€ 93,079	-€ 93,079
	Research & Development	2019	€ 83,904	€ 0	€ 83,904
	Training & Development	2019	€ 508,452	€ 1,357,032	€ 1,865,484
Manufactured	Optimised Hull Form	2019	€ 0	€ 983,488	€ 983,488
	Technical Retrofitting - Energy Efficient Propellers	2019	€ 0	€ 0	€ 0
	Technical Retrofitting - Engine Modifications	2019	€ 0	€ 0	€ 0
	Technical Retrofitting - Low Friction Hull Coating	2019	€ 0	€ 416,047	€ 416,047
	Technical Retrofitting - Scrubbing	2019	€ 0	€ 1,166,533	€ 1,166,533
Natural	Air Pollutants	2019	€ 0	-€ 8,019,325	-€ 8,019,325

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Appendix A | The Value2Society for all 29 Impact Indicators

Capital	Impact Indicator	Year	Shore Side	Ship Side	Total
Natural	Ballast Water	2019	€ 0	-€ 451,275	-€ 451,275
	Black Water Generation	2019	€ 0	-€ 1,889,374	-€ 1,889,374
	Environmental Incidents	2019	€ 0	€ 0	€ 0
	Greenhouse Gas Emissions	2019	€ 0	-€ 3,010,382	-€ 3,010,382
	Grey Water Generation	2019	€ 0	-€ 1,180,859	-€ 1,180,859
	Heavy Metals & Base Cations	2019	€ 0	-€ 69,627	-€ 69,627
	Operational Discharges	2019	€ 0	-€ 48,997	-€ 48,997
	Particulate Matter	2019	€ 0	-€ 1,588,033	-€ 1,588,033
	Waste Generated	2019	€ 0	-€ 20,879	-€ 20,879
Social	Community Investment	2019	€ 5,146	€ 0	€ 5,146
	Gross Value Added - Tax	2019	€ 355	€ 6,740	€ 7,094
Total		2019	€ 1,555,802	€ 2,267,138	€ 3,822,940

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Appendix B | Example Methodology – Bullying, Discrimination & Harassment

Bullying, Discrimination and Harassment | Human Capital

Description

Bullying, discrimination and harassment refers to the negative treatment of individuals within a workplace. This includes the prejudicial treatment of individuals based on their individual characteristics e.g. ethnicity, race, gender, etc. Research suggests that workplace abuse is frequently experienced worldwide and is related to adverse mental health outcomes for employees (Gale, 2019), as well as financial costs to the company, employee and government (UK Health and Safety Executive, 2018).

Approach

This economic valuation methodology evaluates the impact of bullying, discrimination and harassment in terms of financial costs (healthcare costs), and non-financial costs (reduced wellbeing). This methodology draws on the research of Gullander (2014) and Gale (2019) which study the relationship between negative workplace experiences and the development of mental health disorders. This methodology calculates an avoided wellbeing cost per employee equal to £1,360, by multiplying the number of employees experiencing mental health disorders due to negative workplace experiences by disability weight (DW) and Value of Statistical Life Year (VSLY) (please see the Appendix for further explanation on DW & VSLY). The avoided company, employee and government financial costs are calculated by scaling typical financial costs of illnesses to the wellbeing cost of £4,145. For example, HSE values company, employee and government financial cost of a typical illness at £4,000, £400 and £4,300 respectively which relates to an associated wellbeing cost of £9,700. Therefore, for example, for every £1 of avoided wellbeing cost there is £0.44 of avoided government cost. Based on this scaling, avoided wellbeing cost of £1,360 is associated with an adjusted company financial cost of £561, employee financial cost of £56 and government financial cost of £603.

Key References

- Baumeister, R. *et al.* 2001. Bad is Stronger than Good. Rev Gen Psychol 5, 323–370 [Link]
- Gale *et al*. 2019. The Impact of Workplace Harassment on Health in a Working Cohort. [Link]
- Gullander, M. et al. 2014. Exposure to Workplace Bullying and Risk of Depression. J Occup Environ Med 56, 1258–1265 [Link]
- UK Health and Safety Executive. 2018. Costs to Britain of Workplace Fatalities and Self-Reported Injuries and Ill Health, 2016/17. [Link]

Key Assumptions

- Negative experiences have a greater impact on an individual's wellbeing (bullying etc. incurs a wellbeing cost of £760) compared to positive experiences (inclusion incurs an avoided wellbeing cost of £210) (Baumeister, 2001).

Company Data Requirements

- Total number of employees
- Proportion of employees who have experience bullying, discrimination or harassment

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Appendix B I Example Methodology – Bullying, Discrimination & Harassment

Bullying, Discrimination and Harassment I Human Capital		
Stakeholder	**Financial Cost**	**Non-Financial Cost**
	**Company Financial** Reduced productivity	**Company Non-Financial** e.g. reputation costs
	**Employee Financial** Healthcare costs	**Employee Non-Financial** Reduced wellbeing
	**Sector Financial** n/a	**Sector Non-Financial** n/a
	**Government Financial** Healthcare costs	**Government Non-Financial** n/a
	**Wider Society Financial** n/a	**Wider Society Non-Financial** n/a

Notes

Coloured cells indicate the impacts that are captured in this economic valuation methodology. White cells with examples listed ate areas of forthcoming research, while 'n/a' means the impact category has not yet been identified as a priority area of research

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Appendix B I Example Methodology – Bullying, Discrimination & Harassment

Bullying, Discrimination and Harassment I Human Capital		
Data Inputs		
A	Total number of employees **(Company Data Requirement)**	
B	Proportion of employees who have experienced bullying, discrimination or harassment **(Company Data Requirement)**	
C	Value of Statistical Life Year	
D	Average disability weight of mental disorder associated with bullying, discrimination and harassment	
E	Proportion of employees that experience a mental health disorder after bullying, discrimination or harassment	
F	Ratio between wellbeing cost and company productivity loss	
G	Ratio between wellbeing cost and individual loss of income	
H	Ratio between wellbeing cost and government healthcare costs	
Calculation Steps		**Notation**
Step 1 [S1]	Number of employees experiencing bullying, discrimination or harassment	A * B
Step 2 [S2]	Increased cases of depression caused by exposure to bullying, discrimination and harassment	S1 * E
Step 3 [S3]	Reduced wellbeing **(Employee Non-Financial Cost)**	S2 * C * D
Step 4 [S4]	Reduced productivity **(Company Non-Financial Cost)**	S3 * F
Step 5 [S5]	Employee healthcare costs **(Employee Financial Cost)**	S3 * G
Step 6 [S6]	Government healthcare costs **(Government Financial Cost)**	S3 * H

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Appendix C | Frequency of Impact Indicators Listed in Competitor CSR Reports

Capital	Impact Indicator	Details	Number of Times Reported
Human	Global Living Wage	Global Living Wage	4
Intellectual	Training & Development	Health and Safety Training	4
Manufactured	Technical Retrofitting	Scrubbing or Exhaust Gas Cleaning Systems (EGCS)	4
Natural	Ballast Water Management	Ballast Water Treatment	4
Manufactured	Greenhouse Gas Emissions	Scope 1	4
Social	Community Investment	Community Investment	4
Manufactured	Technical Retrofitting	Engine Modifications	3
Manufactured	Technical Retrofitting	Energy Efficient Propellers	2
Manufactured	Technical Retrofitting	Optimised Hydrodynamic Hull Form	2
Manufactured	Technical Retrofitting	Low Friction Hull Coating	2
Manufactured	Technical Retrofitting	Addition of Mewis Duct	2
Manufactured	Technical Retrofitting	Smart Sensors	2
Natural	Air Pollutants	NOx	2
Natural	Air Pollutants	SOx	2
Manufactured	Technical Retrofitting	Liquified Natural Gas (LNG) Engines	1
Manufactured	Technical Retrofitting	Optimising Bow Design	1
Manufactured	Technical Retrofitting	Exhaust Gas Recirculating (EGR) Systems	1
Manufactured	Technical Retrofitting	Electronic Long Stroke Main Engine	1
Manufactured	Technical Retrofitting	Pre-swirl Ducts and Post-Swirl Fins	1
Natural	Particulates	Particulate Matter	1
Social	Flags of Convenience	Choosing a ‘High Standards’ Flag for Vessels	1
Natural	Heavy Metals & Cations	Heavy Metals & Cations	0
Natural	Water Use	Grey Water Generation	0
Natural	Water Use	Black Water Generation	0

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Appendix D I Valuation Approach

Impact Indicator	Description	Quantification Approach	Valuation Approach	Notes
Gross Value Added	The sum of employee compensation, net operating surplus and taxes on production	None, as published in national accounts	None, impact is equal to the economic cost	n/a
Bullying, Discrimination and Harassment	The economic cost of incidences of workplace BDH in terms of a reduction in health and wellbeing and productivity losses	Sector prevalence profiles of the percentage of workplace BDH applied to the number of employees	Number of cases of bullying * increased risk of mental disorders * disability weight * VSLY	Sector profiles of the prevalence of workplace bullying is calculated based on the EUROFOUND survey of workplace conditions. The survey suggests that about 20% of employees in the transport and storage sector experience bullying and harassment annually. Workplace bullying is evaluated by calculating the increased cases of depressive disorders, causally associated with bullying. The reduction in health and wellbeing associated with these cases is evaluated using disability weights, (which are a quantitative value of a persons change in health and wellbeing) and VSLY, (a statistical measure of a person's willingness to pay for a reduction in mortality risk)
Employee Engagement	The economic benefit of employee engagement in terms of avoided productivity losses	Days not lost to presenteeism	Number of engaged employees * days not lost to presenteeism due to engagement * average daily employment costs	Research suggests that all companies suffer from productivity losses as a result of presenteeism (staff that are present in the workplace but not operating at 100% capacity), on average disengaged employees lose 14.1 days as a result of presenteeism compared to 7.6 days for engaged employees
Employee Malpractice	The economic cost of fraud to the company in terms of financial costs	Cost of fraud by employee malpractice case	Number of cases of employee malpractice * the cost of fraud per case	Sector profiles of the cost of fraud is calculated based on the Association of Certified Fraud Examiners. The research finds that the average cost per case of employee malpractice in Western Europe results in an average loss of £180,000
Global Living Wage	The economic benefit of Global Living Wage in terms of increased income	Sector profiles of the proportion of nationalities that comprise the workforce applied to the number of employees	None, impact is equal to economic cost	The proportion of nationalities that make up the workforce of dry bulk vessels are based on research from Ellis and Sampson, 2003. The living wage for each of these nationalities are based on the values needed for a standard family according to wageindicator.org

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Appendix D I Valuation Approach

Impact Indicator	Description	Quantification Approach	Valuation Approach	Notes
Health & Wellbeing	The economic benefit of health & wellbeing support for employees	Investment in employee health & wellbeing multiplied by the Return on Investment of employee heath & wellbeing programs and wellbeing benefit per participant	Hours of employee participation * hourly employment costs * monetary investment * Return on Investment (ROI) multiplier * wellbeing benefit	A SROI multiplier estimates the social benefit resulting from an investment. ROI based on an average of several sources.
Health Insurance Benefits	The economic benefit of Health Insurance in terms of displaced government healthcare costs and avoided wellbeing loss	Mortality rates associated with healthcare insurance are based on cancer detection rates in private vs national healthcare systems	Number of employees receiving health insurance * reduced mortality rate * VSLY	Benefits associated with healthcare insurance are based on statistics of cancer detection rates in private vs national healthcare systems. The method assesses two cohorts, the likelihood of an employee being diagnosed with cancer at a late stage with a fatal outcome, and the likelihood of an employee being diagnosed with cancer at an early stage with a fatal outcome. Research suggests that individuals who have regular healthcare access are 75% more likely to have an early detection which results in an improved life expectancy
Site Safety	The economic benefit of investing in Site Safety in terms of avoided injuries and productivity loss	Investment in safety multiplied by the Return on Investment of accident prevention measures	Investment in site safety * Return on Investment (ROI) multiplier	A SROI multiplier estimates the social benefit resulting from an investment. ROI are driven by reduced absenteeism and therefore increased productivity for the company. Cost ratios, based on HSE appraisal values, have been used to evaluate the avoided government and individual healthcare costs and avoided wellbeing loss based on the ROI for avoided productivity loss.
Workplace Injuries	The economic cost of non-fatal illness and injury in terms of a reduction in health and wellbeing	Country prevalence profiles of Years Lived with Disability (YLD) distributed by industry sector according into risk profiles published by the Health & Safety Executive	YLD * VSLY	Years Lived with Disability (YLD) is a quantitative measure of health and wellbeing. It comprises all non-fatal illness and injury and accounts for the severity of different e.g. diseases or minor injuries. Organisations such as the WHO estimate country YLDs by multiplying the prevalence of illness, injury & disease by the disability weight. Different injuries have different disability weights. For example, a concussion has a DW of 0.054 which effectively means the individual's quality of life is reduced by 5% over that year. Whereas, a spinal cord lesion can have a disability weight of up to 0.73. The economic cost is calculated by using the Value of Statistical Life Year (a statistical measure of a person's willingness to pay for a reduction in mortality risk)
Workplace Fatalities	The economic cost of fatal illness and injury in terms of a reduction in health and wellbeing	Country prevalence profiles of Years of Life Lost (YLL) distributed by industry sector according into risk profiles published by the Health & Safety Executive	YLL * VSLY	Years of Life Lost (YLL) is equal to the number of fatalities multiplied by the remaining years of life expectancy. The inclusion of life expectancy effectively captures the prematurity of mortality. The economic cost is calculated by using the Value of Statistical Life Year (a statistical measure of a person's willingness to pay for a reduction in mortality risk)

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Appendix D I Valuation Approach

Impact Indicator	Description	Quantification Approach	Valuation Approach	Notes
Employee Turnover	The economic costs of employee turnover in terms of logistical costs and reduced productivity	Logistical cost to replace voluntary leavers and productivity losses until new recruits reach their full potential	The voluntary turnover rate * the number of employees * logistical cost of replacement per employee	Logistical costs are evaluated by multiplying the total number of leavers by the average cost of replacing an employee. The calculation also takes into consideration company productivity losses, which is the time taken for a new employee to reach full productivity (estimated at an average of 6.4 weeks)
Research & Development	The economic benefit of investing in research and development in terms of increased knowhow	Country and sector prevalence profiles of investment in R&D	None, the investment in R&D is assumed to equal the economic benefit.	The total investment in research and development by country is calculated based on the World Bank's estimates. This investment is then distributed into sectors that are more R&D intensive. This indicator currently assumes a one-to-one relationship, meaning that the level of investment is equal to the economic benefit.
Training & Development	The economic benefit of investing in employee Training and Development in terms of increasing the knowhow of the workforce	Average expenditure on training and development per employee (by country and sector) multiplied by the number of employees	Investment in training * Return on Investment (ROI) multiplier	Country and sector profiles of the average investment in training and development per employee are generated based on the UK Employer Skills Survey and data from the International Labour Organisation. ROI based on an average of several sources.
Vocational Qualifications	The economic benefit of Vocational Qualifications in terms of increased earning and reduced unemployment	Level and sector specific monetary benefit associated with achieving a vocational qualification	Individuals achieving vocational qualification * increased income/reduced unemployment benefit	Level and sector profiles based on the monetary benefit associated with achieving a vocational qualification in terms of increased wages. Research suggests workers who achieved a qualification at level 4 or above earn on average 25% more than workers without formal qualifications. Level 3 (16%) and level 2 (13%) qualifications result in significantly higher earnings compared to no achievement. In a similar way qualifications impact the probability of an individuals being employed.
Technical Retrofitting and Optimised Hull Form	The economic benefit of Technical Retrofitting in terms of reduced fuel consumption and ambient air pollutants, and therefore avoided health and wellbeing loss	Country and sector impact profiles of Ambient Air Pollutants are multiplied by a Disability Adjusted Life Year characterisation factor (DALY per kg)	DALY * VSLY	Ambient Air Pollutants (GHGs, air pollutants, particulate matter, heavy metals and base cations) are evaluated by estimating the change in health and wellbeing by country. Health and wellbeing is measured using pollutant and country specific characterisation factors which indicate the amount of health and wellbeing loss (DALYs) associated with a kilogram of pollutant

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Appendix D I Valuation Approach

Impact Indicator	Description	Quantification Approach	Valuation Approach	Notes
Air Pollutants	The economic cost of Ambient Air Pollutants in terms of reduced health and wellbeing	Country and sector impact profiles of Ambient Air Pollutants are multiplied by a Disability Adjusted Life Year characterisation factor (DALY per kg)	DALY * VSLY	Ambient Air Pollutants are evaluated by estimating the change in health and wellbeing by country. Health and wellbeing is measured using pollutant and country specific characterisation factors which indicate the amount of health and wellbeing loss (DALYs) associated with a kilogram of pollutant
Ballast Water Management	The economic cost of Ballast Water in terms of invasive species	Clean up costs specific to invasive species	Number of invasive species released in ballast water * distanced travelled * clean up costs	Clean up costs associated with invasive species are evaluated by estimating the average distance over which invasive species are able to travel from the site of release. Costs are measured per kilometre. Not all species become invasive, studies suggest on average 25-30% of non-native plants and invertebrates are successful in becoming invasive
Black Water Generation	The economic cost of Blackwater Generation in terms of energy costs	Energy costs of blackwater treatment are applied to vessel specific data regarding blackwater generation	Blackwater generated per person * energy costs	Energy costs associated with blackwater are linked to operation and management of blackwater treatment per litre. The volume of blackwater produced depends on the type of vessel, the number of employees and the total number of working days
Environmental Incidents	The economic cost of environmental incidents in terms of regulatory administration costs and environmental damage	Remediation and regulatory administration costs associated per environmental incident	Number of environmental incidents (by severity) * remediation costs associated with incidents (by severity)	Environmental incidents are grouped into three severity levels; minor, medium and major based on research from the UK Government. Minor incidents are classified as covering 10m2, medium 25m2 and major 100m2. Each severity has a unique remediation cost which it is multiplied by to obtain the environmental costs. Regulatory administration costs are based on a report by Environment Agency , which states an hourly cost of £84. They report 4 days or more (48hrs) for major incidents, between 2 – 4 days (16h) for medium incidents and no regulatory administration costs for minor incidents
Grey Water Generation	The economic cost of Greywater Generation in terms of energy costs	Energy costs of grey water treatment are applied to vessel specific data regarding greywater generation	Greywater generated per person * energy costs	Energy costs associated with greywater are linked to operation and management of greywater treatment per litre. The volume of greywater produced depends on the type of vessel, the number of employees and the total number of working days

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Appendix D I Valuation Approach

Impact Indicator	Description	Quantification Approach	Valuation Approach	Notes
Greenhouse Gas Emissions	The economic cost of Greenhouse Gas Emissions in terms of climate change and the associated discounted loss in global economic output	Country and sector impact profiles of greenhouse gas emissions multiplied by its Global Warming Potential and by the DALY characterisation factor (DALY per kg)	DALY * VSLY	Greenhouse gas emissions are evaluated by estimating the change in health and wellbeing globally. No country specific factors are used because the cost is universal
Heavy Metals & Base Cations	The economic cost of Heavy Metal Pollutants in terms of reduced health and wellbeing	Country and sector impact profiles of Heavy Metal Pollutant multiplied by the DALY characterization factor (DALY per kg)	DALY * VSLY	Heavy Metal Pollutants are evaluated by estimating the change in health and wellbeing by country. Health and wellbeing is measured using pollutant and country specific characterisation factors which indicate the amount of health and wellbeing loss (DALYs) associated with a kilogram of pollutant
Operational Discharges	The economic cost of Operational Discharge in terms of reduced health and wellbeing	Country and sector impact profiles of Heavy Metal Pollutant multiplied by the DALY characterization factor (DALY per kg)	% of cargo lost * metal pollutant * DALY * VSLY	Research suggests that approximately 0.05% of the cargo is lost as a consequence of e.g. unloading with grabber, washing cargo contaminated surfaces and holds. The volume of heavy metal elements which are released depend on the cargo. For example, coal releases heavy metals through leaching.
Particulate Matter	The economic cost of Particulate Matter in terms of reduced health and wellbeing	Country and sector impact profiles of Particulate Matter Pollutants multiplied by the DALY characterization factor (DALY per kg)	DALY * VSLY	Particulate Matter Pollutants are evaluated by estimating the change in health and wellbeing by country. Health and wellbeing is measured using pollutant and country specific characterisation factors which indicate the amount of health and wellbeing loss (DALYs) associated with a kilogram of pollutant
Community Investment	The economic benefit of Community Investment in terms of increased wellbeing, cohesion, welfare and education	Project specific Social Return on Investment (SROI) multipliers multiplied buy total monetary investment	SROI * total monetary investment	A SROI multiplier estimates the social benefit resulting from an investment. SROI multipliers differ depending on the outcome of the community projects e.g. art and culture, education, heath and wellbeing and social cohesion. ROI based on an average of several sources.

Route2

Thank You