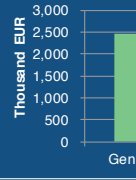
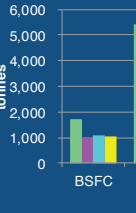


## Output Data - Energy & Emissions

Consumption	Value kWh	Fuel litre	Energy Cost EUR
	9,561,342	2,034,379	2,461,599
	5,533,713	1,178,109	1,425,512
	5,983,516	1,279,400	1,548,074
	5,870,019	1,247,451	1,509,416
	9,561,342	101,719	1,796,315



	CO	No <sub>x</sub>	PM	CO <sub>2</sub>	SO <sub>2</sub>	tonnes
	7.6	25.0	1.0	5,423	1.7	
	7	15.0	0.6	3,152	1.0	
	8	0.6	3,401	1.0		
		0.1	271	0.1		



# Adding Value

## Energy & Emissions Management & Simulation Tool

As one of the world's leading port and marine consultants, Royal HaskoningDHV understands the huge pressures on container terminal operators to reduce OPEX and improve local air quality.

However, many terminals rely on Rubber Tyred Gantry (RTG) cranes still powered by large displacement diesel generators, which are significant contributors to these issues.

Therefore, based on real projects and experience, our experts have developed a Simulation Tool, to help our Clients to fully understand the costs and air quality benefits from a range of available energy efficiency and storage solutions. This allows our Clients to devise clear strategies for equipment upgrades.

As an independent consultant, we have developed the tool to include the majority of RTG cranes and technologies in use today. It has also been verified through a series of rigorous site trials in Valencia, Spain. It currently focusses on RTGs, but could be expanded to other common terminal equipment such as rail mounted cranes, straddle carriers or main cranes.

### Typical savings

40% - 60% annual fuel savings and emission reductions

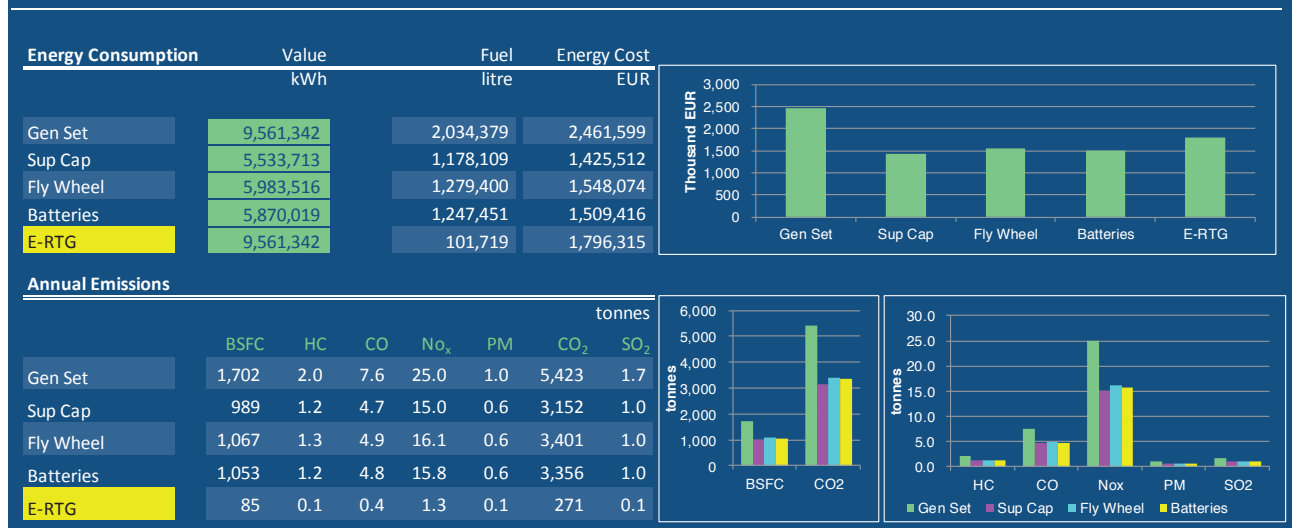
### Client quote

"A good job which, in some aspects (e.g. RTG analysis) goes well beyond our expectations."



Through measures such as; RTG electrification (e.g. cable reel, bus bar), Energy Harvesting, Storage & Reuse (e.g. flywheel, supercapacitor or battery), or RTG genset downsizing, our Clients can achieve tangible improvements in energy efficiency. Typically, this can be in the region of 40-60% in fuel savings, with a consequent reduction in emissions (greenhouse gases, SOx, NOx and particulate matter).

## Output Data - Energy & Emissions



Our teams provide advice throughout the process, from site visits, discussions with operational staff, estimation of current energy demand and emissions, through to presenting options, cost savings, air quality benefits and if required, preparing a supporting business case. This can include upgrade strategies and financial modelling of investment costs, internal rate of return, payback period, achievable CO<sub>2</sub> reductions and carbon tax savings.



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