

Grove Park

Energy Strategy Report

23 DEC 2010

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SCANNED ON  
31 MAY 2011  
PLANNING (IB)





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Audit Sheet

Rev.	Description	Prepared and checked by	Reviewed by	Date by
-	Draft Issue	VL	RE	21.10.10

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## Contents

### EXECUTIVE SUMMARY

#### 1.0 INTRODUCTION

#### 2.0 ENERGY REDUCTION

##### 2.1 The Benchmark Scenario

##### 2.2 Energy Efficiency (Be Lean)

##### 2.3 Low Carbon Technology Assessment (Be Clean)

##### 2.4 Analysis of Renewable Energy Options (Be Green)

#### 3.0 CODE FOR SUSTAINABLE HOMES AND ECOHOMES TARGETS

#### 4.0 CONCLUSION



EXECUTIVE SUMMARY

This report has been produced by Hoare Lea Consulting Engineers to support the planning application for the proposed development at Grove Park, London. The development comprises 5 new build luxury 4 bedroom houses to the rear of the existing house which is to be refurbished to provide 4 luxury apartments and two 4 bedroom luxury houses. The purpose of the report is to demonstrate compliance with the objectives of the London Borough of Southwark, the London Plan, Mayor’s Energy Strategy and London Renewable’s strategy.

This document should be read in conjunction with the Design and Access Statement, Code for Sustainable Homes and ECOHomes Pre-Assessments, Sustainability Assessment Checklist and the associated planning statement.

The energy strategy has been developed in line with the Mayor’s Energy Hierarchy of “Be Lean”, “Be Clean” and “Be Green” scenarios to reduce the energy consumption of the development. Low carbon technology (i.e. Air source heat pumps), renewable technologies, energy-efficient equipment and passive design will be incorporated into the scheme.

Section 2.4 of this report reviews the on site renewable energy options that could be considered for the development. The review considers both technical and physical factors in relation to the various technologies.

The following reductions in CO<sub>2</sub> emissions are predicted for the combined energy Hierarchy stages across the development:

Approaches		Reduction in CO <sub>2</sub> emissions
“Be Lean”- Energy efficiency measures		11%
“Be Clean”-	Air Source Heat Pumps	27%
“ Be Green”	Solar Hot Water	5%

The predicted overall reduction in CO<sub>2</sub> emissions due to the Be Lean, Be Clean and Be Green measures will be approx 43% from the Baseline Building Regulations Part L (2006) compliant scheme.

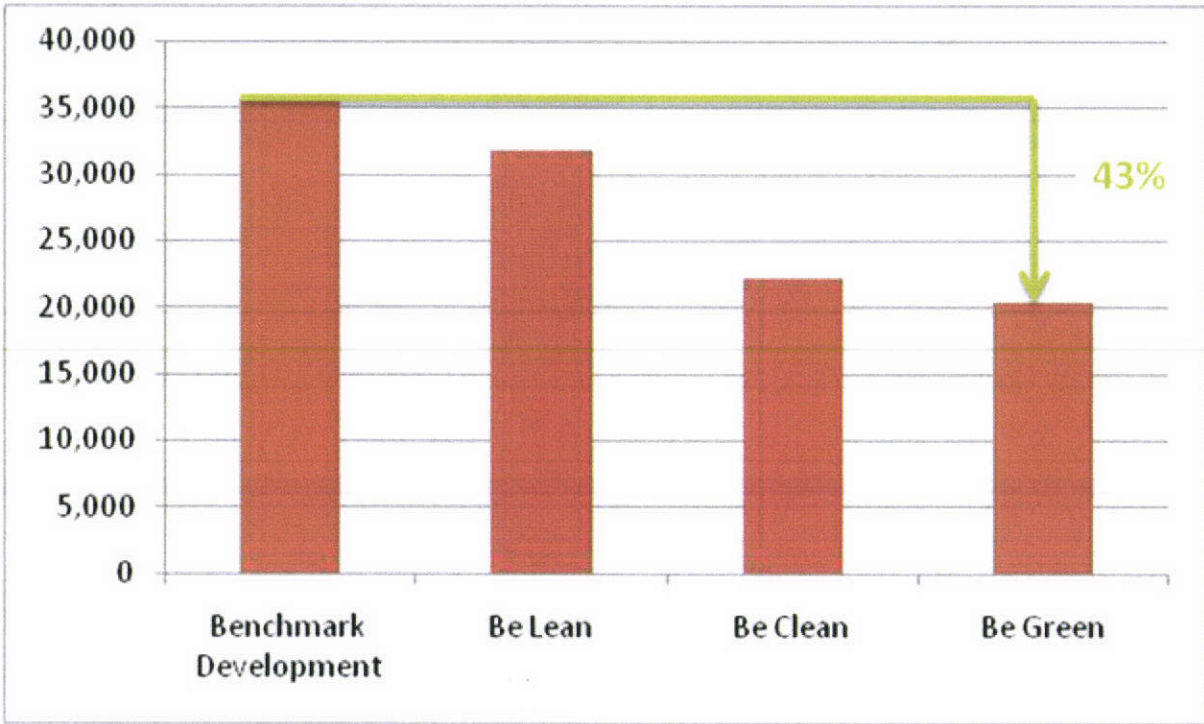


Figure 1: Summary of Annual CO<sub>2</sub> Emissions Reduction





1.0 INTRODUCTION

This report has been produced by Hoare Lea Consulting Engineers to support the planning application for the proposed development at Grove Park, London. The development comprises 5 new build luxury 4 bedroom houses to the rear of the existing house which is to be refurbished to provide 4 luxury apartments and two 4 bedroom luxury houses.

The purpose of the report is to demonstrate compliance with the objectives of the London Borough of Southwark, the London Plan, Mayor's Energy Strategy and London Renewable's strategy.

A low carbon approach will be adopted for the design of the building and for the provision of energy services on the development.

A summary of the annual carbon emissions reductions is included in Figure 1.

Carbon Emissions kg CO2/Annum		
	Total	Reduction%
Benchmark Development	35,743	
Benchmark Development + Energy Efficiency	31,811	11
Benchmark Development + Energy Efficiency + Air Source Heat Pumps	22,160	27
Benchmark Development + Energy Efficiency + Air Source Heat Pumps+ Solar Hot Water	20,373	5

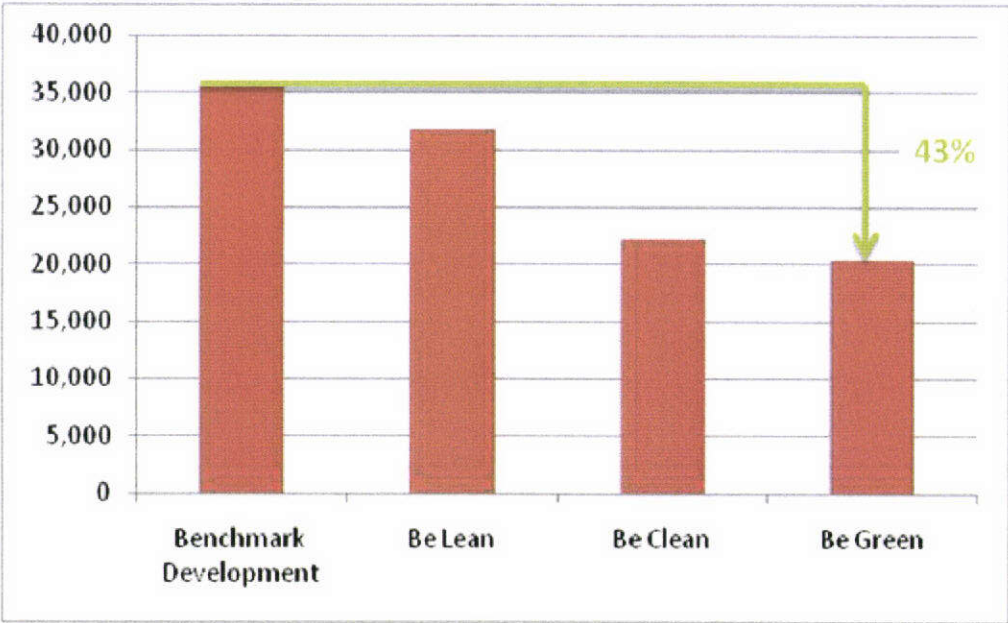


Figure 1: Summary of Annual CO<sub>2</sub> Emissions Reduction

2.0 ENERGY REDUCTION

A summary review of the objectives of the London Plan, the Mayor's Energy Strategy and London Renewables is provided in Appendix A. Use of the *Energy Hierarchy* is advocated to ensure that energy needs are met in the most efficient way:

- i. *Be Lean* -Use less energy
- ii. *Be Clean* - Use low carbon technology
- iii. *Be Green* -Use renewable energy

It is therefore important that energy efficiency as well as renewable energy be considered. In this study the energy consumptions of the development have been assessed based on the "Baseline", "Be Lean", "Be Clean" and "Be Green" models.

2.1 The Baseline Development

The "Baseline" scenario is based on the current proposal for the development and the associated architect's drawings.

The energy assessment is based on indicative SAP models of the proposed unit types.

2.2 Energy Efficiency (Be Lean)

The proposed "Be Lean" measures will reduce the energy consumptions and CO<sub>2</sub> emissions for the development. The building will be constructed to exceed the energy standards required by Part L 2006 of the Building Regulations. This will be achieved by limiting heat loss through roofs, walls, floors, windows, doors, etc by suitable means of thermal insulation and to specify U-values that exceed the minimum requirements of Part L 2006.

The "Be Lean" measures include:

- Use of U-values for thermal elements in excess of the minimum Building Regulations Requirements for all new build elements:
  - Ground Floor 0.2W/m<sup>2</sup>K
  - External Walls 0.25W/m<sup>2</sup>K
  - Roof 0.15W/m<sup>2</sup>K
  - Glazing 1.6W/m<sup>2</sup>K
- Specification of high efficiency whole house mechanical ventilation system with heat recovery.
- Insulation of pipework, ductwork and hot water systems to current and proposed future highest standards.
- Avoidance of excessive 'Thermal Bridging' by using accredited construction details.
- Utilise solar heat gains to benefit the space.
- Provide the required lighting levels whilst minimising energy consumption by effectively controlling the lighting systems by:-
  - using 75% energy efficient lamps and luminaries in all habitable spaces
  - having either suitable manual/automatic switching or both
  - having suitable energy consumption metering
  - having been appropriately commissioned
- Limit unnecessary ventilation heat loss by providing building fabric which is reasonably air-tight (7m<sup>3</sup>/m<sup>2</sup>@50PA), but still provide adequate ventilation for health (Building Regulations Part F)
- Use of efficient systems and equipment with suitable time and temperature controls which have been appropriately commissioned such that the systems can be operated efficiently.
- Minimise lengths and diameters of 'dead-legs'.
- Components i.e. fans, pumps, refrigeration equipment, should be efficient and appropriately sized to have no more capacity for demand and standby than is required for the task so to operate at their optimum levels





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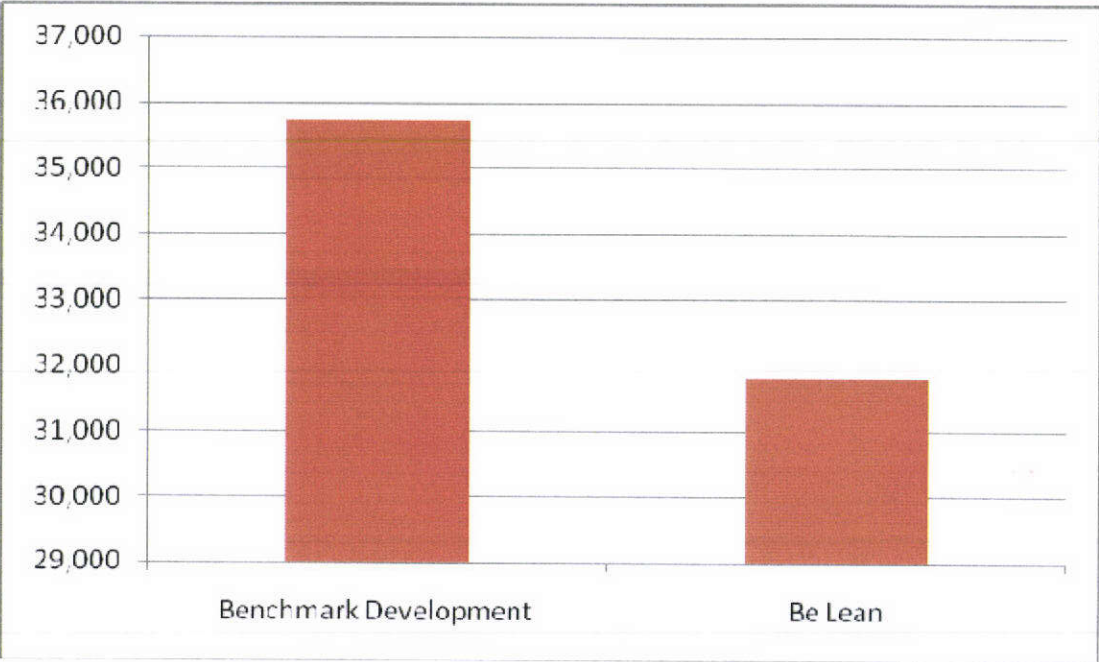


Figure 2: Be Lean – CO<sub>2</sub> Reduction

2.3 Low Carbon Technology Assessment (Be Clean)

Air source heat pumps utilise low grade energy in the air as the heat source in a refrigeration process enabling them to produce hot water, typically at around 45°C, that can be used as a heating medium in buildings. This temperature is ideal for use with the underfloor heating being installed within all the dwellings. Due to the fact a small amount of electrical energy can be used to transfer heat from the atmosphere to the building this technology provides carbon emissions savings over a gas-fired boiler. This technology is well understood and reliable so can be used at Grove Park with confidence of achieving the required carbon reductions with negligible technical risk.

The installation would consist of individual units to serve each dwelling and provide heating and hot water. This will provide a large reduction in energy consumption due to the high Coefficient of Performance (CoP) of this technology. A more modest carbon saving is achieved due to the relative carbon emissions factors for electricity and gas, but this is still significant.

By utilising the increased efficiency from utilizing low grade heat in the air this measure can provide an additional 27% carbon saving.

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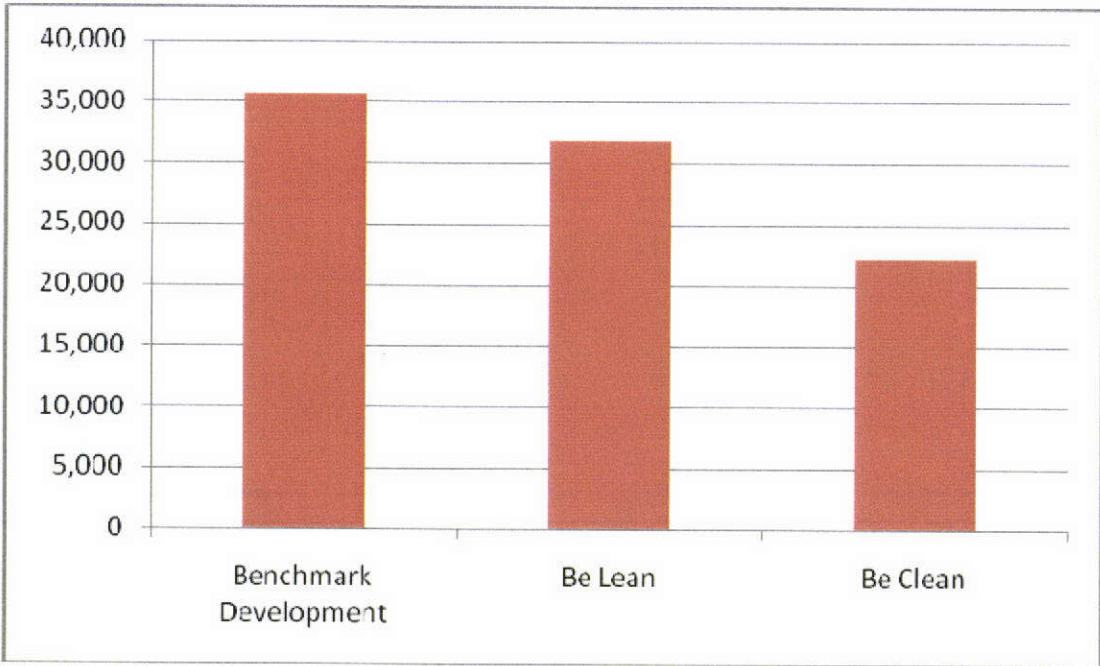


Figure 3: Be Clean – CO<sub>2</sub> Reduction



## 2.4 Analysis of Renewable Energy Options (Be Green)

The following renewable energy sources are considered within the GLA's Renewables Toolkit to have the potential to be employed on developments within the London region:-

- Ground Sourced Heating and Cooling
- Wind Turbines
- Biomass Combined Heat and Power(CHP)
- Fuel Cells
- Solar Photovoltaic (PV) panels
- Solar Thermal Systems
- Biomass Heating

There are various location and physical factors particular to the site which will influence the choice of renewable technologies which need to be considered, these include, but are not limited to:-

- the compact or "tight" nature of the site
- it is an urban development
- the close proximity of other premises

### 2.4.1 Feasibility of Ground Source Heating and Cooling Systems

The nature of the development site in the garden of an existing house with many mature trees means that the potential for installation of a ground source heat pump system of a large enough size to serve the number of dwellings proposed for the development would be extremely restricted and therefore it is not proposed for this development.

### 2.4.2 Feasibility of Wind Turbines

The average wind speed is not anticipated to be sufficient for the application of this technology. Large stand alone wind turbines would also increase the noise levels of the development which would not be acceptable to the Environmental Health Department. Therefore, this technology is not proposed for this development.

### 2.4.3 Biomass Heating

Biomass boilers are an established technology, using natural fuel such as wood chips or wood pellets for combustion. Typically, boiler efficiencies in excess of 80% are achievable. Carbon dioxide that is emitted during combustion of wood matter is absorbed during growth, forming a virtually carbon neutral cycle. In general, emissions will be lower using wood chips rather than pellets, as they are less energy-intensive to process.

It is acknowledged that biomass heating to achieve a reduction in on-site carbon dioxide emissions is not suitable for every site, particularly in city centre locations.

Therefore, due to the constraints the fact that biomass heating is not favoured due to implications with deliveries of fuel supplies and associated fume discharge from boilers, the use of biomass heating is not considered as a suitable renewable energy technology for this development.

### 2.4.4 Feasibility of Biomass Combined Heat and Power (CHP)

Biomass CHP is still an emerging technology which has yet to be proven reliable in the UK and is therefore, not proposed for this development.

### 2.4.5 Feasibility of Fuel Cells

The majority of fuel cell applications are in the US and Japan with very few installations currently within the UK, of which these are only pilot demonstration projects. Therefore, this is not considered a viable technology for the development.

### 2.4.6 Feasibility of Solar Photovoltaic (PV) Panels

The potential CO<sub>2</sub> savings from PV at this development are not anticipated to be as high as those achievable through the installation of solar hot water panels. Due to the high capital cost and limited benefit in terms of carbon reduction it is deemed that the inclusion of the PV's is not practical and the capital can be usefully invested elsewhere to make the scheme more sustainable overall.

### 2.4.7 Feasibility of Solar Thermal Systems

It is proposed to install solar hot water panels to serve each of the dwellings. Due to the air source heat pumps being electrically powered there will be CO<sub>2</sub> savings in offsetting some of the electrical power required to provide hot water to the dwellings and this has therefore been found to provide the most favourable CO<sub>2</sub> reductions and to be the most practical solution for the development.

Each new 4 bedroom house and the two 4 bedroom houses within the refurbishment will be provided with 5m<sup>2</sup> of solar hot water panels. Each single storey apartment will be served by 3m<sup>2</sup> of solar hot water panels with 5m<sup>2</sup> provided for the two and three storey apartments.

By providing a proportion of each dwelling's hot water via solar thermal systems a predicted CO<sub>2</sub> saving of 5% is anticipated to be achieved across the development.

## 3.0 CODE FOR SUSTAINABLE HOMES AND ECOHOMES TARGETS

The development at Grove Park is proposed to include the construction of 5-7 new luxury houses and the refurbishment of the existing house into 2 houses and 5 apartments. The new houses are to achieve compliance with the Code for Sustainable Homes 4\*\*\*\* rating and the refurbished dwellings are to comply with ECOHomes Excellent.

The Code for Sustainable Homes incorporates a number of mandatory credit requirements and this includes a mandatory target reduction in CO<sub>2</sub> emissions over the Part L1A 2006 baseline.

In order to achieve a 4\*\*\*\* rating a reduction of at least 44% in the CO<sub>2</sub> emissions of the dwellings will need to be achieved. Preliminary SAP calculations have been carried out on the individual new build houses and it has been found that the measures proposed within this energy strategy will provide an individual reduction in CO<sub>2</sub> of around 47% over Part L1A 2006, this is comfortably in excess of the minimum requirements for compliance with Code for Sustainable Homes Level 4\*\*\*\* in terms of ENE1 credits.

The ECOHomes assessment method does not refer to mandatory targets but a minimum score of at least 70% will be required to secure the Excellent rating, in order to achieve this a significant CO<sub>2</sub> reduction will be key. Preliminary SAP calculations for the proposed refurbished dwellings have been undertaken and show a likely DER of below 15kgCO<sub>2</sub>/m<sup>2</sup>/yr which is sufficient to achieve 11 of the 15 available credits within the ENE1 credit section. This is in line with the likely requirements to ensure that the overall Excellent score of 70% is achieved.



#### 4.0 CONCLUSION

An assessment of the estimated annual energy requirements for the development at Grove Park in London has been carried out to demonstrate compliance with the objectives of the City of Westminster, the London Plan, Mayor's Energy Strategy, etc. The adopted strategy has been developed in line with an energy hierarchy of "Be Lean", "Be Clean" and "Be Green" stages to reduce the energy consumption of the overall development.

The calculated reduction in the total annual carbon emissions for the development from the "Be Lean" proposals is approximately 11% and with the inclusion of "Be Clean" technology in the form of Air Source Heat Pumps a further 27% reduction would be achieved. This will be accompanied by a further 5% reduction through the installation of "Be Green" technology in the form of solar hot water panels.

In summary, through the inclusion of air source heat pumps, solar hot water and many 'Be Lean' energy efficient measures, the following reduction in CO<sub>2</sub> emissions will be achieved:

The predicted overall reduction in CO<sub>2</sub> emissions for the whole development due to the Be Lean, Be Clean and Be Green measures will be 43% from the baseline Building Regulations Part L (2006) compliant scheme.

Carbon Emissions kg CO <sub>2</sub> /Annum		
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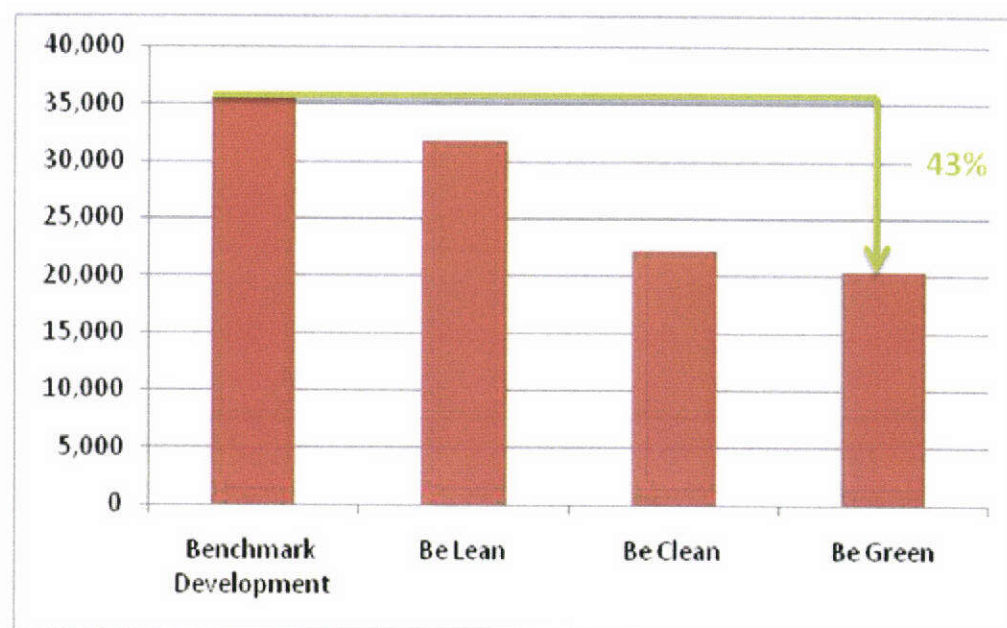


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