Clean Air Business Case Framework

OCTOBER 2022
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Introduction to the business case framework

**Objective**
Showcase how acting on clean air and reducing emissions creates value that is relevant to your organization

Present a framework for you to understand how you can assess this value and use it to make investment decisions

**Intended audience**

**Private sector**
- Business executives
- Sustainability teams
- Project managers

**When & how to use the framework**
The business case framework should be used at the inception and development stages of a business case.

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End-to-end examples

Appendix
Building your business case – summary

When using this 5-step process to build a clean air business case, you can start from scratch or by jumping ahead to any other step based on how far your company is on its journey to reduce air pollution.

Organization A  We want to engage more in tackling air pollution but we haven’t focused on that problem before

We have analysed our impact and possible mitigation measures and now need to secure investment

Organization B

Introduction

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</thead>
<tbody>
<tr>
<td><strong>Input</strong></td>
<td>- Key Messages about Clean Air for Decision-Makers</td>
<td>- Operational data</td>
<td>- Pollution source mapping</td>
<td>- Mitigation activities</td>
<td>- Business case</td>
</tr>
<tr>
<td></td>
<td>- External advice</td>
<td></td>
<td>- Operational data</td>
<td>- External advice</td>
<td>- Leadership time</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>- Initiative planning go-ahead</td>
<td>- Detailed pollution assessment</td>
<td>- List of mitigation activities</td>
<td>- Business case</td>
<td>- Signed-off business case</td>
</tr>
</tbody>
</table>
Leadership engagement
1.1 Leadership engagement

Educating your executives and gaining their buy-in is the first step in your organization’s journey to reduce air pollution. Executive sponsorship will allow for the right resources to be allocated and for blockers to be removed.

Required
1. Read the Key Messages about Clean Air for Decision-Makers, scanning for the information that will resonate with your key decision-makers and use this to engage and educate your leadership in conversation.
2. Extract from the Key Messages about Clean Air for Decision-Makers those that are most pertinent to your organization and use them to create page 1 of your business case in order to set the scene.

Input
Key Messages about Clean Air for Decision-Makers

Output
Decision for leadership to examine your organization’s air pollution footprint
### Leadership engagement – stakeholders

The sustainability and change teams will need to engage executives to communicate the importance of air pollution reduction and the need to invest in initiatives to fight air pollution.

<table>
<thead>
<tr>
<th>Step</th>
<th>Executives</th>
<th>Finance</th>
<th>Change/strategy</th>
<th>Supply chain &amp; operations</th>
<th>Sustainability</th>
<th>External organizations</th>
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<tr>
<td>Leadership engagement</td>
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<td>Pollution source identification</td>
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<td>Business benefit assessment</td>
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<td>Leadership decision</td>
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</tbody>
</table>
2 Pollution source identification
2.1 Greenhouse gases (GHGs) & air pollution

Investing in clean air initiatives to benefit human health naturally compliments your fight to reduce GHG emissions. This is because GHGs and air pollution are often produced through the same processes.

As with GHG emissions, for mapping purposes, air pollution can be examined through the lens of scopes 1, 2 & 3.

**Scope 1**
Emissions that a company makes directly, e.g. factory furnaces, vehicle fleet, airborne fertilisers.

**Scope 2**
Emissions that a company makes indirectly, e.g. purchase of electricity.

**Scope 3**
Emissions that the company is indirectly responsible for throughout its extended value chain, e.g. supplier emissions, employee commuting.

Air pollutants come from many sources but especially from burning fossil fuels for power, transport and industry.

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2.2 Every organization can tackle air pollution

Air pollution is something that organizations in every sector can tackle. Companies that do not directly emit significant amounts can work on reducing scope 2 and 3 emissions.

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<td>2</td>
<td>Pollution source identification</td>
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<td>Business benefit assessment</td>
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<td>5</td>
<td>Leadership decision</td>
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### 2.3 Pollution source identification

To start your air pollution reduction journey you will need to understand and assess your air pollution footprint.

#### Required

1. Map out your organization’s value chain, highlighting areas of pollution throughout each link in the chain.

2. Map which pollutants are emitted throughout the chain with an estimation (or actual) amount for each.

#### Inputs

- Operational data
- Emissions factors
- Stakeholder engagement
- External advisory (if necessary)

#### Output

End-to-end (E2E) value chain air pollution inventory

Most human-produced air pollution is derived from power generation, transport, industry, agriculture and waste. See the [Key Messages about Clean Air for Decision-Makers](#) for more information.

You can use freely available materials to understand where and how your company might be generating air pollution.

#### Sample relevant external materials

- [Stockholm Environment Institute](#), Creating a practical guide to quantify and reduce air pollution from businesses, 2021.
## 2.4 Pollution source identification – stakeholders

The sustainability and change teams will need to work with operations and potentially external stakeholders to help you understand your organization's air pollution footprint.

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**Appendix**
Mitigation measures
3.1 Mitigation measures

Once you understand how and at what scale your organization emits air pollutants you will need to determine what actions your organization should take to reduce this.

**Required**

Following the examination of the quantity of pollutants emitted throughout its extended value chain, your organization must assess what measures would be the most effective to mitigate these emissions.

**Input**

Teams from within your organization or external advisory.

The Stockholm Environment Institute (SEI) uses its wealth of knowledge and experience in this area to provide advice on the most appropriate measures for your organization to consider.

**Output**

List of mitigation options aligned to pollutants.

SEI will be releasing a guide that will showcase key mitigation measures you can undertake for each type of emissions source. The first phase is due to be released in late 2022.

The following pages showcase high-level remediation activity examples prepared for operations involving energy, agriculture and transportation.

These 3 areas generate a significant amount of air pollution and therefore are a subject of focus. You can take action if your organization’s extended value chain includes any of these activities.

Each activity is linked to the relevant United Nations Sustainable Development Goal (SDG).
Mitigation measures – examples for energy

Fossil fuel combustion to generate electricity is one of the largest sources of air pollution because 71% of this energy originates from non-renewable sources. Mitigation measures your company can implement include:

- Installing solar panels on company buildings
  - SDG7  SDG8  SDG13
  - Green: Environmental
  - Blue: Social
  - Purple: Governance
  - Orange: Non-financial impact
  - Yellow: Financial impact

- Implementing energy saving initiatives
  - SDG11  SDG12  SDG13
  - Green: Environmental
  - Blue: Social
  - Purple: Governance
  - Orange: Non-financial impact
  - Yellow: Financial impact

- Using green hydrogen fuel cells
  - SDG9  SDG12  SDG13
  - Green: Environmental
  - Blue: Social
  - Purple: Governance
  - Orange: Non-financial impact
  - Yellow: Financial impact

- Replacing diesel with biodiesel
  - SDG3  SDG12  SDG13
  - Green: Environmental
  - Blue: Social
  - Purple: Governance
  - Orange: Non-financial impact
  - Yellow: Financial impact

For illustration purposes only
3.3 Mitigation measures – examples for transportation

Harmful pollutants from road transport include particulate matter, nitrous oxide (NOx), carbon monoxide and hydrocarbons. In some areas, road transport can account for over 50% of NOx emissions. Mitigation measures can include:

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For illustration purposes only
Mitigation measures – examples for agriculture

The agriculture sector is responsible for a considerable amount of air pollution. This is mainly due to the use of nitrogen-rich fertilisers, animal waste and industrial machinery. Mitigation measures can include:

- Using drones to spray pesticides
  - SDG9 SDG12 SDG14/15
  - Environmental
  - Social
  - Governance
  - Non-financial impact
  - Financial impact

- Solar-powered water pumps
  - SDG9 SDG12 SDG14/15
  - Environmental
  - Social
  - Governance
  - Non-financial impact
  - Financial impact

- Biodiesel-powered tractors and harvesters
  - SDG12 SDG13 SDG14/15
  - Environmental
  - Social
  - Governance
  - Non-financial impact
  - Financial impact

- Alternate use of crop residue instead of burning
  - SDG8 SDG12 SDG14/15
  - Environmental
  - Social
  - Governance
  - Non-financial impact
  - Financial impact

For illustration purposes only

For illustration purposes only
### Mitigation measures – stakeholders

With a clear view of your organization’s air pollution footprint, it now falls to the change/strategy and sustainability functions in consultation with operations and any external advisers to develop a series of activities to mitigate it.

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<td>Mitigation measure development</td>
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**Appendix**
Business benefit assessment
4.1 Business benefit assessment

Creating a thorough business case requires a step-by-step approach and expertise from across your company.

**Required**
Once you have a list of mitigation measures, you must build a financial and ESG value case for each one to understand their attractiveness.

**Input**
Internal/external subject matter adviser access
Operational data to develop benefits assessment

**Output**
Financial and ESG value assessments against each proposed air pollution reduction initiative. This will allow for informed decision-making and prioritization of reduction measures.

---

**4.1** Understand the dimensions of value
**4.2** Map out financial value levers
**4.3** Map out areas of ESG impact

**4.4** Decide what to measure and how
**4.5** Measure & assess financial impact
**4.6** Measure & assess ESG impact

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**Stakeholder engagement**
4.2 Business benefit process

It is recommended that, when executing an initiative made up of distinct mitigation measures, you carry out steps 4.1–4.6 for each mitigation action before aggregating the information.

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**Clean Air Business Case Framework**

**Mitigation measures**

- **4.1 The dimensions of value**
  Develop an understanding of value, financial value levers and ESG impact areas.

- **4.2 Map out financial value levers**
  Study how each mitigation measure will create value and select the financial value levers that will capture this.

- **4.3 Map out areas of ESG impact**
  Study the initiative and contrast with the SDGs. Identify SDGs with the highest impact.

- **4.4 Decide what value levers & ESG areas to assess (diagram)**
  Determine which value levers and areas of ESG impact are to be measured/quantified and how.

- **4.4 Assess the “benefits” of each value lever and ESG impact area (table)**
  Asses the value created through modelling or measurement.

- **4.5 – 4.6 Calculate and aggregate financial metrics and ESG impact**
  Aggregate the financial and the ESG impact value of all remediation measures and derive key metrics.

- **4.7 Stakeholder communication**
  Once the business benefits are understood they must be presented alongside any other relevant information.

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**Sample Business Benefits Process Sheet**

**Initiative Brief**

This initiative will consist on replacing combustion furnaces with electric convection systems and the summary of all assessment of this initiative in different stages and measures used to make the savings process to assess if the proposed measures can be modelled and employed with alternative technologies less polluting or more efficient.

**Areas of Change**

- **Production facilities**
  - Diesel-powered machines
  - Electric motors

- **End-Mile e-mobility**
  - Hybrid inputs
  - Hydrogen inputs

- **Reduction company CO2 footprint**

**Reduction Targets**

Through action in 3 areas the film sites to reduce the emission of volatile organic compounds (VOC), nitrogen oxides (NOx), sulfur oxides (SOx), and aerosols (PM10), which are known as PM2.5 particles.

**Financial Value Levers**

<table>
<thead>
<tr>
<th>Area of Change</th>
<th>Value levers</th>
<th>KPI</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>Reduction in energy consumption</td>
<td>kWh</td>
<td>£1.5M</td>
</tr>
<tr>
<td>Products</td>
<td>Reduction in maintenance costs</td>
<td>£/yr</td>
<td>£0.9M</td>
</tr>
<tr>
<td>Transport</td>
<td>Reduction in fuel costs</td>
<td>£/km</td>
<td>£0.4M</td>
</tr>
<tr>
<td>Vehicle Fleet</td>
<td>Reduction in energy consumption</td>
<td>kWh</td>
<td>£0.9M</td>
</tr>
</tbody>
</table>

**ESG Areas Of Impact**

- **PM2.5**
  - Annual reduction of PM2.5 levels in the affected area
  - BTEX reduction
  - Improvement in air quality

- **NOx**
  - Reduction in NOx emissions
  - Improvement in air quality

**Overall Aggregated Benefits**

- **Financial Benefits**: £M p.a.
- **ESG Value**: £M p.a.
- **Estimated Cost**: £M.
4.3
The dimensions of value

Clean air initiatives can create value through different levers that could directly benefit your company’s bottom line. They can also create additional value across many areas that benefit local communities and society as a whole, beyond the company itself.

- Revenue increase
- Brand value
- More tangible/shorter-term value
- Less tangible/longer-term value
- Cost reduction
- Risk reduction
- Increase
- Reduce

Company value  Societal value
4.4 Mapping out financial value levers

Each distinct measure of a clean air initiative must be assessed to determine in which way it creates value. A single measure might do this through multiple value levers simultaneously.

**Revenue increase**
- Sales growth from differentiation or premiumization
- Improved access to market in emerging economies
- Broadened product and service portfolio via sustainable innovation
- Increased productivity

**Cost reduction**
- Reduced staff illness (absence and healthcare costs)
- Increased feeling of safety among employees (churn reduction)
- Decreased healthcare costs
- Increased worker productivity (resulting in reduced unit cost)
- Reduced input costs
- Improved reliability of supplies

**Highly relevant for clean air initiatives**

- **Brand value**
  - Improved ESG performance
  - Improved consumer sense of trust and loyalty
  - Productive and ongoing dialogue with regulatory authorities
  - Enhanced brand/share value
  - Talent attraction and retention

- **Risk reduction**
  - Secure “license to operate”
  - Reduced reputational risks
  - Reduced regulatory and litigation risks
  - Greater knowledge of supply chain risks
  - Closer stakeholder relations

<table>
<thead>
<tr>
<th>More tangible/shorter term</th>
<th>Less tangible/longer term</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increase positive</strong></td>
<td></td>
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<tr>
<td><strong>Material business value levers</strong></td>
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</tr>
<tr>
<td><strong>Increase negative</strong></td>
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</tbody>
</table>

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4.5 Mapping out areas of ESG impact

Tackling air pollution contributes to all of the SDGs, either directly or indirectly. You must assess which SDGs your chosen initiatives will impact and how.

Called out below are the 3 SDGs that directly reference air quality. Many of your initiatives will likely contribute to these. In order to identify what other SDGs your initiatives may indirectly contribute to, it is recommended that you review the full list.

**SDGs directly related to air pollution**

- **SDG 3**
  - Ensure healthy lives and promote well-being for all at all ages: Target 3.9 – By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

- **SDG 11**
  - Make cities and human settlements inclusive, safe, resilient and sustainable: Target 11.6 – By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

- **SDG 12**
  - Ensure sustainable consumption and production patterns: Target 12.4 – By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment

**SDGs indirectly related to air pollution**

- **SDG 1** End poverty
- **SDG 2** End hunger
- **SDG 4** Quality education
- **SDG 5** Gender equality
- **SDG 6** Clean water & sanitation
- **SDG 7** Affordable & clean energy
- **SDG 8** Decent work & economic growth
- **SDG 9** Industry, innovation and infrastructure
- **SDG 10** Reduced inequalities
- **SDG 13** Climate action
- **SDG 14** Life below water
- **SDG 15** Life on land
- **SDG 16** Peace, justice and strong institutions
- **SDG 17** Partnerships for the goals

SDGs directly related to air pollution

SDGs indirectly related to air pollution

You must assess which SDGs your chosen initiatives will impact and how.

Called out below are the 3 SDGs that directly reference air quality. Many of your initiatives will likely contribute to these. In order to identify what other SDGs your initiatives may indirectly contribute to, it is recommended that you review the full list.
Deciding what to assess & how

Because clean air has such wide-ranging benefits, you must identify which value levers and areas of ESG impact are most relevant to each remediation measure, make a selection and decide how to quantify them (if required).

### When to assess/measure

<table>
<thead>
<tr>
<th>Value lever/ESG impact area</th>
<th>High-value potential</th>
<th>Low-value potential</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Easy to measure</td>
<td>Measurement recommended</td>
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<td></td>
<td>Easy to measure</td>
<td>Measurement to be considered</td>
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<td></td>
<td>Hard to measure</td>
<td>Measurement not recommended</td>
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</table>

### You can assess the impact of each value lever or ESG impact area by using widely adopted business methods

<table>
<thead>
<tr>
<th>Quantification method</th>
<th>When to employ</th>
<th>Considerations</th>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumption-based modelling</td>
<td>- Generally recommended method</td>
<td>- Not based on actual/direct data</td>
<td>- Allows to form an “idea” of the impact that an initiative has created</td>
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<tr>
<td></td>
<td>- When carrying out direct measurement is costly or impractical</td>
<td></td>
<td>- Less time-/resource-intensive</td>
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<tr>
<td></td>
<td>- Data available on the impact of pollutant reductions</td>
<td></td>
<td>- Can be grounded in serious scientific evidence or prior experience</td>
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<tr>
<td>Randomized control trials (RCT)</td>
<td>- When direct measurement required</td>
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<td>- Uses actual data</td>
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<td></td>
<td>- When time and resources are available</td>
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<td>- Reduces the risk of external factors impacting measurements</td>
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<tr>
<td></td>
<td>- When accuracy is an important consideration</td>
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<tr>
<td>Measure pre- and post-change air pollution levels</td>
<td>- When direct measurement is required</td>
<td>- Requires RCT knowledge/ experience</td>
<td></td>
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<tr>
<td></td>
<td>- When RCTs are impractical</td>
<td>- Can be more resource-intensive or impractical</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Uses actual data</td>
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For example, you can assess the impact of each value lever or ESG impact area by using widely adopted business methods. For instance, you can

- **Assumption-based modelling**
  - Generally recommended method
  - When carrying out direct measurement is costly or impractical
  - Data available on the impact of pollutant reductions

- **Randomized control trials (RCT)**
  - When direct measurement required
  - When time and resources are available
  - When accuracy is an important consideration

- **Measure pre- and post-change air pollution levels**
  - When direct measurement is required
  - When RCTs are impractical

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**End-to-end examples**

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**Clean Air Business Case Framework**
4.7 Measure & assess financial impact

To assess the financial impact of an initiative you must assess each value lever individually.

Each value lever will need at least one key performance indicator (KPI) that will allow changes in its value to be translated into either gains or losses.

When you have measured the change in the values of your KPIs you can assess the full financial value created.

Example: Switching from traditional cars to an electric vehicle (EV) fleet

<table>
<thead>
<tr>
<th>Value lever</th>
<th>KPI</th>
<th>Reduction</th>
<th>Expected benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fuel cost reduction</td>
<td>Avg. price per vehicle per mile per year</td>
<td>40%</td>
<td>X million p.a.</td>
</tr>
<tr>
<td>2. Maintenance cost reduction</td>
<td>Avg. maintenance cost per vehicle per year</td>
<td>20%</td>
<td>X thousand p.a.</td>
</tr>
<tr>
<td>3. Tax savings</td>
<td>Avg. tax costs per vehicle per year</td>
<td>$500 per vehicle</td>
<td>X million p.a.</td>
</tr>
</tbody>
</table>

Once you have a good view of the benefits and costs you can determine metrics such as payback, net present value (NPV) and the internal rate of return (IRR).

Having a KPI for each value lever will allow you to track performance during and after the change has been implemented, providing valuable management information.
Measure & assess social impact

Tackling air pollution creates value for society in a number of different areas. It is sometimes possible to quantify this value and include it in the metrics that you will use to evaluate the initiative as a whole.

You can do so by following this sample framework

1. Identify which air pollutants will be reduced
2. Understand mitigation potential of initiative
3. Assess the reduction in each pollutant
4. Determine through which SDGs value will be created
5. Calculate value created for each SDG
6. Calculate SROI

Example

It is determined that an initiative made up of 4 measures will mainly have an ESG impact on the health and productivity of people living within a 10-km range of an industrial plant. The value added to each SDG impact area has been quantified as follows:

- Estimated wider health benefit $400,000 p.a.
- Estimated productivity benefit $400,000 p.a.

In this example the value created across ESG areas of impact is $800,000 p.a.

Combining this with the financial cashflows and calculating their NPV would allow you to determine the initiative’s SROI.

Social return on investment (SROI) =

\[
\text{Initiative NPV (financial + ESG flows)} \div \text{Initial investment} \times 100\%
\]
Stakeholder communication

Communicating your efforts to mitigate air pollution to the right stakeholders is essential for your organization to reap the full value. There is a strong relationship between ESG and air pollution. However, despite the ESG agenda being a top priority for many executives, the clean air element is often overlooked. This is an untapped opportunity.

Turning your company into a champion for clean air and communicating your efforts are important as they will turn your organization into a pioneer and put pressure on other companies to follow suit.

Some of the benefits can only be reaped if effectively communicated, such as brand value and risk mitigation.

---

Leadership engagement
Pollution source identification
Mitigation measure development
Business benefit assessment
Leadership decision
End-to-end examples
Appendix
### Business benefit assessment – stakeholders

It is up to the change/strategy team to communicate and engage the finance function to scrutinise and help develop the business case before it goes to the executives.

<table>
<thead>
<tr>
<th>Step</th>
<th>Executives</th>
<th>Finance</th>
<th>Change/strategy</th>
<th>Supply chain &amp; operations</th>
<th>Sustainability</th>
<th>External organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership engagement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pollution source identification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mitigation measure development</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business benefit assessment</td>
<td>![x]</td>
<td>![x]</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Leadership decision</td>
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</tbody>
</table>

**Introduction**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leadership engagement</td>
</tr>
<tr>
<td>2</td>
<td>Pollution source identification</td>
</tr>
<tr>
<td>3</td>
<td>Mitigation measure development</td>
</tr>
<tr>
<td>4</td>
<td>Business benefit assessment</td>
</tr>
<tr>
<td>5</td>
<td>Leadership decision</td>
</tr>
</tbody>
</table>

**End-to-end examples**

**Appendix**
Leadership decision
5.1 Leadership decision

Before you can make a decision on whether to invest in a clean air initiative it is important to have a good understanding of the initiative, its costs and benefits.

### Required

Once the impacts and benefits have been defined you must create a compelling case to communicate the key information to executives.

### Inputs

- Clean air initiative information
- Business benefit assessment

### Output

- Clean air initiative business case (see example)
- Investment decision
Leadership decision – stakeholders

With a clear understanding of the gameplan and expected returns, the executives must now review the business case and decide whether to invest and implement or not.

<table>
<thead>
<tr>
<th>Step</th>
<th>Executives</th>
<th>Finance</th>
<th>Change/strategy</th>
<th>Supply chain &amp; operations</th>
<th>Sustainability</th>
<th>External organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership engagement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pollution source identification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mitigation measure development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business benefit assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leadership decision</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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1. Leadership engagement
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4. Business benefit assessment
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End-to-end examples

Appendix
End-to-end examples
Using materials from SEI and internal input from the operations and sustainability teams, the marine freight company identifies 2 areas as potential sources of particulate matter.

<table>
<thead>
<tr>
<th>Initiative focus area</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ships</td>
<td>Air pollutants such as sulfur oxides (SOx), nitrogen oxides (NOx) and particulate matter (PM10) are significant environmental externalities from the use of fuel by marine shipping companies. These pollutants tend to have localized environmental and health impacts and are especially a concern at port cities. The company possesses 12 large and 10 medium-sized vessels that operate globally and are its main source of particulate matter. At present some of these ships incur hefty fines when transiting certain regions due to emissions.</td>
</tr>
<tr>
<td>Fuel</td>
<td></td>
</tr>
</tbody>
</table>

After developing a list of potential remediations, the following are selected as the most impactful.

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Initiative components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ships</td>
<td>Ship upgrade: Retrofit 10 ageing ships with more efficient engines and other equipment to enable the use of electricity from the ground network when docked. This will reduce the company's fuel expenditure at sea and replace fuel with electricity as a source of power when at port.</td>
</tr>
<tr>
<td>Fuel</td>
<td>Switch to cleaner fuel: Procure a fleet-wide supply with a maximum sulphur concentration of 1.5% to reduce SOx emissions.</td>
</tr>
</tbody>
</table>

The remediations are mapped against financial value levers and areas of ESG impact.

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Initiative components</th>
<th>Value levers</th>
<th>Social impact areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ships</td>
<td>Ship upgrade</td>
<td>Fuel efficiency, Maintenance costs, Law compliance</td>
<td>SDG 3 – Good health and well-being, SDG 11 – Sustainable cities and communities, SDG 14 – Life below water</td>
</tr>
<tr>
<td>Fuel</td>
<td>Switch to cleaner fuel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Financial value assessment

<table>
<thead>
<tr>
<th>Value lever</th>
<th>Measurable KPI</th>
<th>Reduction</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel efficiency</td>
<td>Engine: Avg. miles per gallon (at sea)</td>
<td>- 1% efficiency (sea)</td>
<td>1% * $300 million (prior year fuel cost) = $3 million</td>
</tr>
<tr>
<td></td>
<td>Avg. expenditure per kW (at port)</td>
<td>- 10% price decrease (port)</td>
<td>10% * $4 million (prior year port fuel burn) = $400,000</td>
</tr>
<tr>
<td>Maintenance costs</td>
<td>Avg. engine maintenance cost per ship</td>
<td>- 5% reduction</td>
<td>5% * $20 million (prior year engine maintenance cost) = $1 million</td>
</tr>
<tr>
<td>Law compliance</td>
<td>Avg. amount paid in regulatory fines</td>
<td>- 20% reduction</td>
<td>20% * $1 million (prior year environmental fines) = $200,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>$4.6 million</td>
</tr>
</tbody>
</table>

ESG value achieved

The initiative will result in an estimated 70% reduction in PM10 and PM2.5. This will create social value mainly by contributing to 3 SDGs.

External: estimated $1.5 million p.a.

Internal: minimal impact

The initiative will improve air quality in portside populations, reducing the incidence of respiratory and coronary disease and improving cognition.

No measurement (captured above)

The initiative will improve air quality in portside populations and economic areas. This might positively influence real estate prices in the long term.

Measurement deemed non-cost effective

The initiative will improve the health of the marine ecosystem. This will have a considerable impact in port cities where commercial/subsistence fishing is a large industry.

Business benefits summary

Implementation cost: $40 million
Estimated useful life: 10 years
Social value created: $1.5 million p.a.
SROI: 29.2%
IRR: 2.63%
Payback: approx. 9 years
Leadership engagement
Pollution source identification
Mitigation measure development
Business benefit assessment
Leadership decision

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End-to-end examples

Using materials from SEI and internal input from the operations and sustainability teams, the professional services company identifies 3 areas as potential sources of particulate matter.

<table>
<thead>
<tr>
<th>Initiative focus area</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings</td>
<td>Combustion partly employed in energy supply and in heating, office in high-pollution area leading to high employee exposure</td>
</tr>
<tr>
<td>Data centres</td>
<td>Energy-intensive, combustion partly employed in energy supply</td>
</tr>
<tr>
<td>Employee commuting</td>
<td>Intense particulate generating activity; high level of employee exposure to particulate matter even on public transport</td>
</tr>
</tbody>
</table>

After developing a list of potential remediations, the following are selected as the most impactful.

<table>
<thead>
<tr>
<th>Initiative focus area</th>
<th>Initiative components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings</td>
<td>Work from home: Shifting from a 4 to 1 day in the office per week model</td>
</tr>
<tr>
<td>Data centres</td>
<td>After researching this area the company determines that it already uses a 3rd party cloud supplier that uses green energy to power its operations. No action required.</td>
</tr>
<tr>
<td>Employee commuting</td>
<td>Employee facemask subsidy: Subsidizing FFP2 masks for commuting and daily life. Public transport subsidy: Providing employees with rail passes, discount cards and bike subsidies.</td>
</tr>
</tbody>
</table>

The remediations are mapped against financial value levers and areas of ESG impact.

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Initiative components</th>
<th>Value levers</th>
<th>Social impact areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings</td>
<td>Work from home</td>
<td>Energy savings</td>
<td>SDG 3 – Good health and well-being</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Office space reduction</td>
<td>SDG 11 – Sustainable cities and communities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduction in scope 1</td>
<td>SDG 12 – Responsible production</td>
</tr>
<tr>
<td></td>
<td></td>
<td>emissions</td>
<td>and consumption</td>
</tr>
<tr>
<td>Data centres</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Employee commuting</td>
<td>Employee facemask subsidy</td>
<td>Reduction in sick days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Public transport subsidy</td>
<td>Increased productivity</td>
<td></td>
</tr>
</tbody>
</table>
Leadership engagement
Pollution source identification
Mitigation measure development
Business benefit assessment
Leadership decision

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End-to-end examples

Appendix

Clean Air Business Case Framework

Financial value assessment

<table>
<thead>
<tr>
<th>Value lever</th>
<th>Measurable KPI</th>
<th>Reduction</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy savings</td>
<td>Reduction in kw per hour</td>
<td>40%</td>
<td>40% * $500,000 (prior year energy spending) = $200,000</td>
</tr>
<tr>
<td>Office space reduction</td>
<td>Reduction in desks or square metres required</td>
<td>30%</td>
<td>30% * $1 million (prior year rental cost) = $300,000</td>
</tr>
<tr>
<td>Reduction in sick days</td>
<td>Reduction in avg. sick days per employee p.a.</td>
<td>2 days p.a.</td>
<td>1,000 (employees) * $100 (estimated daily productivity value) * 2 days = $200,000</td>
</tr>
<tr>
<td>Reduction in scope 1 emissions</td>
<td>Reduction in tonnes of carbon emitted</td>
<td>20%</td>
<td>20% * 10,000 CO₂ tonnes (prior year estimate) * $50 (estimated credit price) = $100,000</td>
</tr>
<tr>
<td>Increased productivity</td>
<td>Increase in output</td>
<td>5% (increase)</td>
<td>5% * (230 prior year productive days per employee) * $100 (estimated day productivity value) * 1,000 (employees) * 50% shrinkage = $275,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>$1.38 million</td>
</tr>
</tbody>
</table>

Social value achieved

The initiative will result in an estimated 50% reduction in PM10 and PM2.5

This will create social value mainly by contributing to 3 SDGs.

External: estimated wider health benefit $200,000 p.a.

Internal: reduction in sick days = $200,000 p.a.

Measurement deemed non-cost effective

The initiative will improve air quality in urban areas by discouraging unnecessary and polluting commuting and reduce employee exposure to high-concentration areas.

Measurement deemed non-cost effective

The initiative will improve air quality in urban areas for others outside of the organization.

Measurement deemed non-cost effective

The initiative will contribute to other professional services companies adopting a responsible production model.

For illustration purposes only

Business benefits summary


Implementation cost: $7 million

Initiative lifetime: 7 years

Social value created: $400,000 p.a.

SROI: 57%

IRR: 8.77%

Payback: approx. 6 years

Clean Air Business Case Framework

For illustration purposes only
Using materials from SEI and internal input from the operations and sustainability teams, the company identifies 2 areas as potential sources of particulate matter.

<table>
<thead>
<tr>
<th>Initiative focus area</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilisers (suppliers)</td>
<td>Ammonia fertilisers employed in 2/3 of supplier plantations in the Americas region. These combine with combustion by-products to form PM2.5, damaging health and water ecosystems when this filters through to waterways.</td>
</tr>
<tr>
<td>Transportation (in-house)</td>
<td>Raw materials transported from farms/wholesalers to production facilities mostly by truck, generating a considerable CO₂ and particulate matter footprint.</td>
</tr>
</tbody>
</table>

After developing a list of potential remediations, the following are selected as the most impactful.

<table>
<thead>
<tr>
<th>Initiative focus area</th>
<th>Initiative components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilisers (suppliers)</td>
<td>Remediation subsidies: Provide grants that enable a reduction in the use of nitrogen-based fertilisers or reduce their impact to selected suppliers.</td>
</tr>
<tr>
<td>Transportation (in-house)</td>
<td>Supplier re-evaluation: Include distance and transport emissions as supplier evaluation criteria. Drop and replace 15% of suppliers who generate the most CO₂ and air pollution when transporting supplies to the company’s production centres. Transportation overhaul: Replace 80% of transportation from road to rail, replace long-haul trucks with a fleet of electric last-mile delivery vehicles where possible.</td>
</tr>
</tbody>
</table>

The remediations are mapped against financial value levers and areas of social impact.

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Initiative components</th>
<th>Value levers</th>
<th>Social impact areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilisers (suppliers)</td>
<td>Remediation subsidies</td>
<td>Cereal cost reduction</td>
<td>SDG 6 – Clean water and sanitation</td>
</tr>
<tr>
<td></td>
<td>Supplier re-evaluation</td>
<td>Transportation cost reduction</td>
<td>SDG 12 – Responsible production and consumption</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CO₂ emissions reduction</td>
<td>SDG 13 – Climate action</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SDG 14 – Life below water</td>
</tr>
<tr>
<td>Transportation (in-house)</td>
<td>Transportation overhaul</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For illustration purposes only
End-to-end examples

Process example – sourcing (2/2)

Financial value assessment

<table>
<thead>
<tr>
<th>Value lever</th>
<th>Measurable KPI</th>
<th>Reduction</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereal cost reduction</td>
<td>Kg of nitrogen fertiliser per tonne of cereal</td>
<td>5%</td>
<td>5% * $1 * 20 million kg = $1 million</td>
</tr>
<tr>
<td>Transportation cost reduction</td>
<td>Avg. transportation cost per kg</td>
<td>55%</td>
<td>55% * $273 * 10,000t (prior year cost per tonne (t) shipped) = $1.5 million</td>
</tr>
<tr>
<td>CO₂ emissions reduction</td>
<td>Avg. CO₂ emissions per kg</td>
<td>30%</td>
<td>Cost of carbon certificate negligible</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>$2.5 million</td>
</tr>
</tbody>
</table>

Social value achieved

The initiative will result in an estimated 40% reduction in ammonia emissions and a 10% reduction in CO₂ emitted across the value chain. This will create social value mainly by contributing to 3 SDGs.

Social cost per kg of ammonia to human health (DEFRA estimate) = $10 (middle range value)
Estimated reduction = 30 tonnes of ammonia p.a.
Estimated value = $10 * 30,000 kg = $300,000

Social cost per kg of ammonia to ecosystems (DEFRA estimate) = $5 (middle range value)
Estimated reduction = 30 tonnes of ammonia p.a.
Estimated value = $5 * 30,000 = $150,000

Measurement deemed non-cost effective
Initiative will contribute to combatting climate change by reducing CO₂ emissions.

Business benefits summary

Financial benefits: $2.5 million p.a.
Implementation cost: $19 million
Initiative life expectancy: 9 years
Social value created: $450,000 p.a.
SROI: 20.2%
IRR: 3.5%
Payback: approximately 8 years

For illustration purposes only
Appendix
A co-dependence occurs when initiatives that overlap (either in their baseline or measurement timelines) measure efficiencies in the same areas or have an indirect impact on the data that is used to measure either initiative.

This can be a problem because it means that the benefits are double counted.

**Illustrative example**

- **Change initiative 1 value**
- **Perceived change initiative 2 value when measured**
- **Real (individual) value of change initiative 2**
- **Total value (initiative 1 + 2)**
### How to adjust for co-dependence

There are several ways to adjust for co-dependence to ensure that you don’t overestimate value.

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Principle</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Adjust the timing of the deployment and measurement of the solutions.</strong></td>
<td>Time overlapping initiatives to be sequential (one after the other).</td>
<td>Deploy and measure value of clean air initiative 1. Repeat the process with clean air initiative 2.</td>
</tr>
<tr>
<td><strong>2. Segregate areas within each region where the change initiative is being deployed to create separate samples.</strong></td>
<td>Carry out simultaneous measurement in the same regions. Divide each region into 2 groups and use each group to measure a different initiative. This method can only be used with prior planning.</td>
<td>Deploy and measure clean air initiative 1 in region A, and do the same with initiative 2 in region B.</td>
</tr>
<tr>
<td><strong>3. Remove the scope of one initiative on the other at a micro or macro level (apply adjustment).</strong></td>
<td>Remove individual instances that are present in the data that is used to evaluate 2 initiatives that are being measured at the same time and in the same regions.</td>
<td>Deploy clean air initiatives 1 and 2 at the same time/place, measuring the value of both and remove the value created by one from the other using micro-level data or at a macro level using assumptions.</td>
</tr>
<tr>
<td><strong>4. Have 1 initiative “hoover” all the benefits.</strong></td>
<td>Removing co-dependence is not possible, so all the value is measured through one initiative and then apportioned (if necessary, across others).</td>
<td>Deploy clean air initiatives 1 and 2 at the same time/place but only measure the benefits for one of these initiatives, understanding that it also captures the value of the other one.</td>
</tr>
</tbody>
</table>
Sources


Deloitte, Scope 1, 2 and 3 emissions, what you need to know, https://www2.deloitte.com/uk/en/focus/climate-change/zero-in-on-scope-1-2-and-3-emissions.html.

Department for Environment, Food and Rural Affairs (DEFRA), Air Pollution From Agriculture, 2018.


Stockholm Environment Institute, Creating a practical guide to quantify and reduce air pollution from businesses, 2021.


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