STEP UP Training Materials
Glasgow Learning Network

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Identifying City Challenges and Opportunities:
A Guide to Problem/Solution Tree Analysis

Glasgow
Ghent
Gothenburg
Riga

STEP UP brings together excellence in energy and urban planning from four European cities to achieve a greater sustainability impact

Contents

Introduction to STEP UP training materials

These materials have been produced by the EU FP7 STEP UP project (Strategies Towards Energy Performance and Urban Planning), which runs from 2012 to 2015. STEP UP brings together excellence in energy and urban planning from four European cities – Ghent, Glasgow, Gothenburg and Riga – to develop enhanced Sustainable Energy Action Plans (SEAPs) and innovative city projects that integrate energy, transport and ICT to achieve a greater sustainability impact.

As part of the project, each STEP UP city is working with a wider Learning Network of cities to maximise impact by replicating STEP UP activity in local city contexts, transfer skills, and promote the sharing and dissemination of city experiences and knowledge. This includes the production of training materials and courses for professionals working on sustainable city planning in Learning Network cities.

Who is this guidebook for?

This guidebook has been designed by the Glasgow STEP UP partners (University of Strathclyde, Glasgow City Council and Scottish Power) for the Glasgow Learning Network of cities[1], and any other cities or Local Authorities interested in tools which can be applied to assist with planning for low carbon futures.

The guidebook is designed to allow professionals working on improving sustainable city planning to identify and better understand the challenges their city, or Local Authority area, faces and to identify potential actions or strategies which could help to overcome these challenges whilst moving towards the city's low carbon goals.

This training guide is particularly relevant for policy and project officers working in the areas of climate change, sustainability and resilience, but can also be applied in the context of planning, housing, transport, regeneration and other Local Authority departments.

How to use this guidebook

This guidebook is divided into key sections to help you find the information most relevant to your own city. It has been designed to be used as a step-to-step guide to conducting problem/solution tree analysis, a tool which can help to identify and address key city challenges. It can also be used to supplement existing city initiatives and planning processes by providing examples of good practice from STEP UP cities, lessons learned and recommendations. It also provides a brief overview of the STEP UP approach to producing enhanced SEAPs.

More information about STEP UP can be found at **www.stepupsmartcities.eu**

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[1] The term 'city' is used frequently throughout this guidebook, as it is cities which make up the primary Glasgow Learning Network, through the Scottish Cities Alliance. However, the approaches and tools can also be applied to other types of Local Authorities, covering smaller urban areas or large rural areas.

Identifying city challenges and opportunities

Assessing key city challenges and identifying opportunities to address these can be a difficult area for Local Authorities, but is important for delivering integrated sustainability strategies and plans that tackle Council priorities and deliver multiple benefits.

Problem/solution tree analysis is a tool that can be used to help sustainability and project officers to consider the potential solutions that are within their power to implement in order to address key challenges, and to identify opportunities that can deliver multiple social, environmental and economic benefits.

Sustainable Energy Action Plans

Through the Covenant of Mayors[2] (CoM) initiative, cities across Europe are voluntarily committing to increasing energy efficiency and adopting renewable energy technologies. By signing up to the CoM, cities pledge to meet and exceed the EU 20% CO_2 reduction target by 2020 and to produce a Sustainable Energy Action Plan (SEAP) for their city. A SEAP is a key city document which details how this target will be met, setting out a programme of actions and measures that will be implemented, together with timeframes and assigned responsibilities.

STEP UP project

The STEP UP project takes an integrated approach to energy planning, innovative project design and implementation by addressing three key themes together:

+ Energy and technology;
+ Economics; and
+ Organisation and stakeholders.

Through these themes, the STEP UP cities – Ghent, Glasgow, Gothenburg and Riga – have been working to significantly enhance their initial SEAPs, and to develop innovative, integrated projects which address multiple policy objectives within their cities. STEP UP aims to demonstrate that integrated planning achieves better energy outcomes and offers greater environmental, social and economic benefits, compared to traditional energy planning approaches.

Through the project, the STEP UP cities have identified key climate and energy challenges in their cities; in Glasgow, this has involved using the problem/solution tree analysis tool in city workshops.

The main benefits of this work are that:

+ Identifying city challenges helps cities to better understand their own barriers to sustainable city planning; and
+ The problem/solution tree analysis tool provides a structured framework to consider potential solutions to these challenges, which can then feed into future project developments and can highlight possible actions for inclusion in a city's SEAP.

Problem/solution tree analysis

A tool for analysing key challenges and identifying potential solutions

Problem/solution tree analysis is a tool which helps to understand complex challenges, and to find appropriate solutions by mapping out the cause and effect of each particular issue in detail.

What is a problem/solution tree?

A **problem tree** provides an overview of the known causes and effects of an identified problem. The analysis is structured so that cause and effect are laid out visually, showing linkages between different factors. Causes form the roots of the tree, the core problem is the trunk, and the consequences are the branches of the tree.

A **solution tree** outlines the initiatives, actions and projects which develop as logical solutions from the initial problem tree.

How can it help cities and Local Authorities?

Understanding the challenges a city or a Local Authority is facing is an essential stage of project planning, ensuring the development of sound policies and plans that tackle the roots of a problem effectively. It may be relatively easy to produce a high level list of challenges in your city or Local Authority area, but understanding their different and interacting causes is important to ensure that any interventions are appropriately designed and tailored to achieve objectives local to your city context.

A problem tree helps to reveal the complexity of a given problem. As there is often more than one cause to a problem, it is important to recognise which can be overcome and which cannot be influenced, and to have a good understanding of how this may impact on project opportunities. By transforming the problem tree into a solution tree, possible actions and project objectives can start to be realised.

Once complete, a problem/solution tree analysis can be used as a tool to support the identification of new actions, policies or instruments, in a variety of different departmental contexts.

At the heart of the exercise is the opportunity for discussion, debate and dialogue focussed on complex challenges. Carrying out the analysis with relevant internal and/or external stakeholders can be effective in improving understanding of the local context, challenges and opportunities, providing opportunities to share different perspectives, consider problems in new ways and consider alternative solutions.

What are the benefits?

The tool is similar to a mind map, but is more structured. This structured approach creates several advantages:

+ The problem being analysed is broken into manageable chunks. This allows for a clearer understanding of what the key problem actually is, assists in focussing objectives and helps to prioritise different issues;
+ The problem is better understood as a result of the analysis, by considering multiple, interconnecting and conflicting causes.
+ Different components of the problem are considered, helping to establish the actors and related processes which cause or impact on different stages of the problem and potential solutions;
+ Information gaps relating to the problem or potential solutions can be identified, or any other resources required to build a strong case for a robust solution to be developed.
+ The focus is on identifying and dealing with present issues.
+ Undertaking the analysis often assists in developing a shared sense of understanding about the issue being analysed, and encourages participants to consider different perspectives.

What is the background of the tool?

Problem tree analysis is a tool adopted by a number of development agencies, such as the Overseas Development Institute[3] (ODI), forming part of a Logical Framework Analysis (LFA) methodology. LFA is used in many development and aid agencies, due to its value in planning, monitoring and evaluating projects. For more information, visit the ODI website[4].

How has it been used in STEP UP?

Within the STEP UP project, problem/solution tree analysis has been applied in two main contexts:

To analyse city challenges and opportunities in Glasgow

STEP UP partners in Glasgow (Glasgow City Council, University of Strathclyde and Scottish Power) used problem/solution tree analysis to analyse and develop a better understanding of key challenges faced by the city, and potential solutions which are within the control of the Local Authority. This was achieved through a series of workshops with relevant internal and external stakeholders, providing different perspectives on key issues and possible solutions which could be implemented. This work has fed directly into Glasgow's Energy and Carbon Masterplan[5] (the city's enhanced SEAP) and has also influenced the development of projects within the city.

To analyse knowledge exchange challenges within the STEP UP project

Representatives from all STEP UP partner organisations were involved in undertaking a problem/solution tree analysis to better understand the challenges experienced in meeting project deadlines for reports and other outputs, whilst also having sufficient time to reflect on the work being carried out and learn from other city approaches, from within the project and from other cities in the Learning Network. Solutions identified as part of this have allowed for improved communication and reflection between project partners.

STEP UP partners in Glasgow used problem/solution tree analysis to analyse and develop a better understanding of key challenges faced by the city

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[3] www.odi.org
[4] www.odi.org/publications/5258-problem-tree-analysis
[5] Please see Glasgow City Council's website for the city's enhanced SEAP,
  www.glasgow.gov.uk/index.aspx?articleid=11066

Problem/solution tree analysis – a step-by-step approach

This section provides a step-by-step guide to conducting a problem/solution tree analysis. The process followed here is based on Glasgow's experience of using the tool as part of the STEP UP project.

Pre-workshop preparation and planning

Within your team, identify a list of key challenges which you would like to explore and understand further. This may be drawn from political priorities, such as affordable warmth, or from plans, policies and current projects. The challenges should be clear topics but do not require a detailed description at this stage. An example of a challenge identified in Glasgow during the STEP UP project, in the context of developing an enhanced SEAP, is detailed below:

> **Challenge topic**
>
> *Transport and Mobility*
>
> **Summary**
>
> *Transport and mobility is critically important to the economic success of Glasgow but the challenge is to develop more sustainable transport in the city.*

Schedule a workshop for the problem/solution tree analysis to explore a challenge topic in more detail. The step-by-step analysis process outlined below should be followed for one problem, and related solutions, at a time.

For each challenge topic, consider inviting some relevant stakeholders who will be able to offer useful insights and different perspectives on the challenge. A manageable size for conducting an analysis is 6–8 people; any more than this and you may find that it becomes difficult to have an effective discussion with input from all those present.

> **Who should be involved?**
>
> *For cities and Local Authorities looking to develop a problem tree, the analysis is best undertaken by:*
>
> + *Key members of the team working on SEAP development/low carbon initiatives within the Local Authority;*
> + *Key internal and external stakeholders, appropriate to the problem being examined.*
>
> *For the topic of transport and mobility, for example, this could involve some internal stakeholders from different departments within the Council, such as transport and air quality, and some external stakeholders, such as local transport providers or transport partnership bodies.*

> **Tip**
>
> To reduce time demands on participants, you may want to schedule a couple of sessions to run in parallel, each focussed on a separate challenge topic. Working groups can be brought together at the end of the workshop, providing an opportunity for each group to briefly present their results and for discussion of potential opportunities to explore further and next steps.
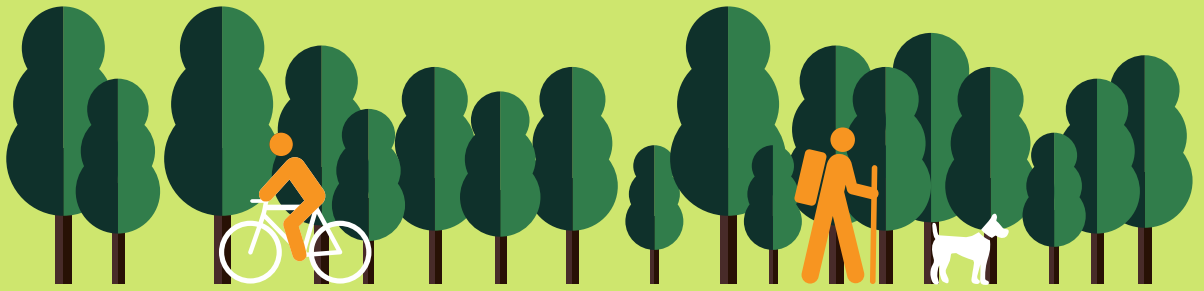
During the workshop

On the day, or prior to the workshop, provide participants with a brief introduction to the purpose of a problem/solution tree analysis and an overview of the process and topics to be considered. This will help to familiarise participants with the process which will be followed in the workshop itself and allow them to consider some key causes or consequences of the problem in advance of the session.
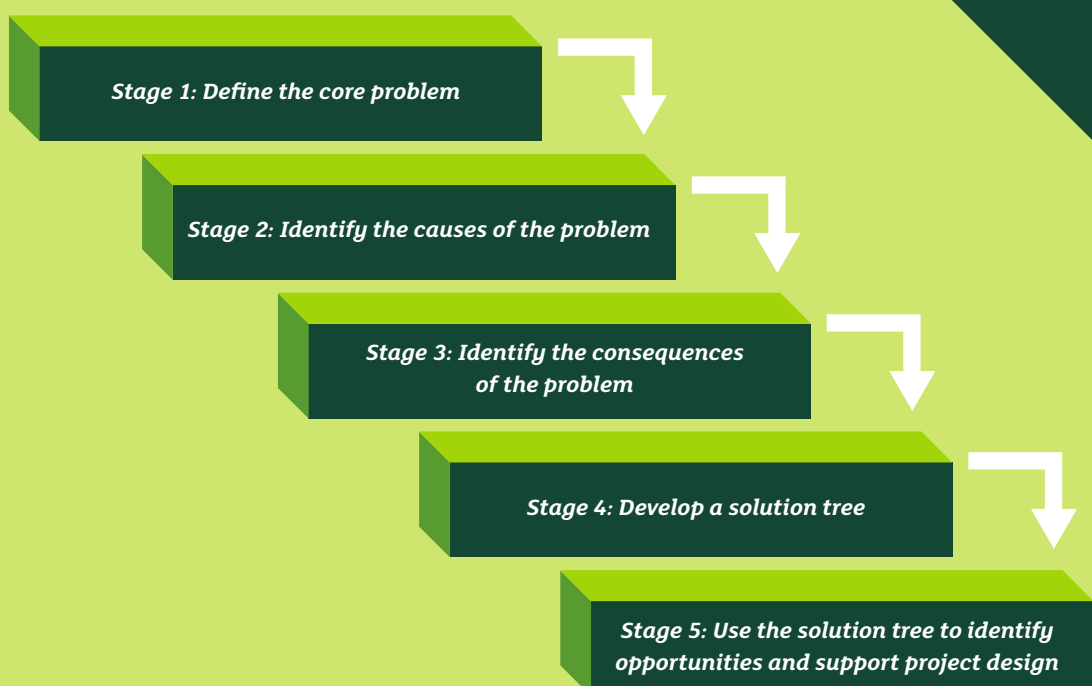
The key suggested steps to follow in a problem/solution tree analysis are summarised in Figure 1 below, and set out in detail on the following pages.

Tip

Defining a problem in the right words, and noting the relationships between different ideas takes time, and having space to reword and move text around is very useful, particularly in the early stages of an analysis. A whiteboard allows ideas and the links between them to be changed, reworded or moved easily. If this isn't possible, try to use large sticky notes, pieces of paper and sticky tape or a flipchart.

Figure 1
Key stages of problem/solution tree analysis

Stage 1: Define the core problem

Stage 2: Identify the causes of the problem

Stage 3: Identify the consequences of the problem

Stage 4: Develop a solution tree

Stage 5: Use the solution tree to identify opportunities and support project design

Stage 1:
Define the core problem

A project or initiative should have a specific problem it seeks to overcome. Starting with the challenge topic selected for the session, discuss and agree on a definition of the problem amongst the group, as this is essential for developing an accurate problem tree. When your group is happy with the wording of the problem, place it at the centre of the tree.

Core problem

Fossil fuel based transport use in Glasgow is too high

Stage 2:
Identify the causes of the problem

Now, focus on the primary causes of the problem. Each cause should be phrased in negative terms. Place each primary cause below the core problem on the tree.

Secondary causes should also be placed on the tree, underneath the primary causes. Gradually, you should start to see a number of indirect and direct causes of the problem emerge, forming the roots of the tree.

Example causes

+ *Alternative forms of transport are not sufficiently attractive;*
+ *Poor integration of land use and transport planning;*
+ *Alternative vehicle technologies are not yet well established.*

Tip

A vague or broad problem will have too many causes for effective and meaningful solutions and projects to be developed. Do not rush this stage. It is also not unusual to review the definition later in the analysis, as discussions may clarify aspects of hard-to-define problems.

Tip

You may find you need to move causes as the discussion progresses, deciding whether they are primary or secondary in nature, or that some areas of the tree are more complex and require numerous interlinking causes to be recognised.

Stage 3:
## Identify the consequences of the problem

Now, focus on the consequences of the problem. What effect does it have? Consider social, environmental, economic, political and technological consequences.

Place consequences above the core problem. Primary consequences should be directly above the core problem, with secondary consequences placed at the top of the tree, as in Figure 2. As before, you may need to move consequences around until the group is happy with the relationships between different consequences.

Example consequences

+ High emissions are increasing the challenge of meeting the city's CO_2 target;
+ Less active travel (leading to poor health);
+ Congestion.

Figure 2
Problem tree structure
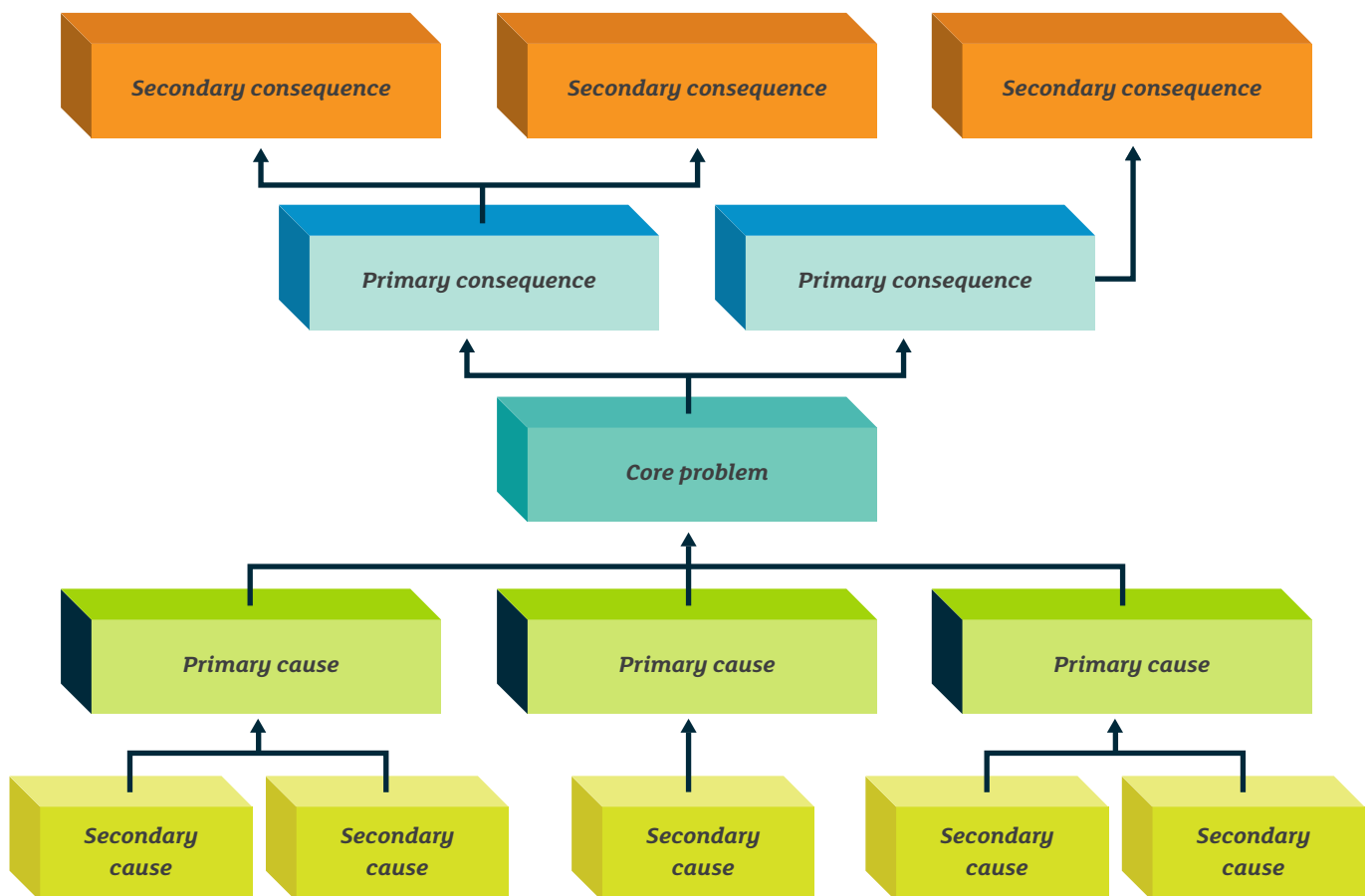
Stage 4: Develop a solution tree

A solution tree is created by reversing the negative statements that form the problem tree into positive statements where the 'challenge' has been solved. This is done for the core problem, causes and consequences. In this way, a root problem is turned into a core objective, and negative causes and consequences of this problem are turned into positive causes and consequences of this core objective.

The reversed statements in the solution tree can then help you to consider what actions or interventions (solutions) might lead to the identified positive causes, and what long-term objectives might be met as a result of the identified positive consequences.

Tip

Check the language carefully in each box; it is not always possible for a statement to be reversed to its polar opposite. For example, if the core problem identified for a city was 'City X has slow regeneration', the polar opposite would be 'City X has fast regeneration'. However, this does not necessarily capture a situation where the challenge has been solved. Rephrasing to 'City X has healthy regeneration' may be a better option.

The table below gives an example of how the negative statements in a problem tree can be reversed in a solution tree.

| Problem tree	Solution tree
Core problem	**Core objective**
Fossil fuel based transport use in Glasgow is too high	Lower fossil fuel based transport use in Glasgow
Primary cause	**Cause**
Citizens have poor knowledge of alternative transport options	Citizens have good knowledge of alternative transport options
Secondary cause	**Solution**
Lack of effective interventions such as public communications campaigns	Effective interventions such as effective public communications campaigns
Consequence	**Consequence**
High emissions are increasing the challenge of meeting the city's CO_2 target	Lower emissions are increasing the potential of meeting the city's CO_2 target
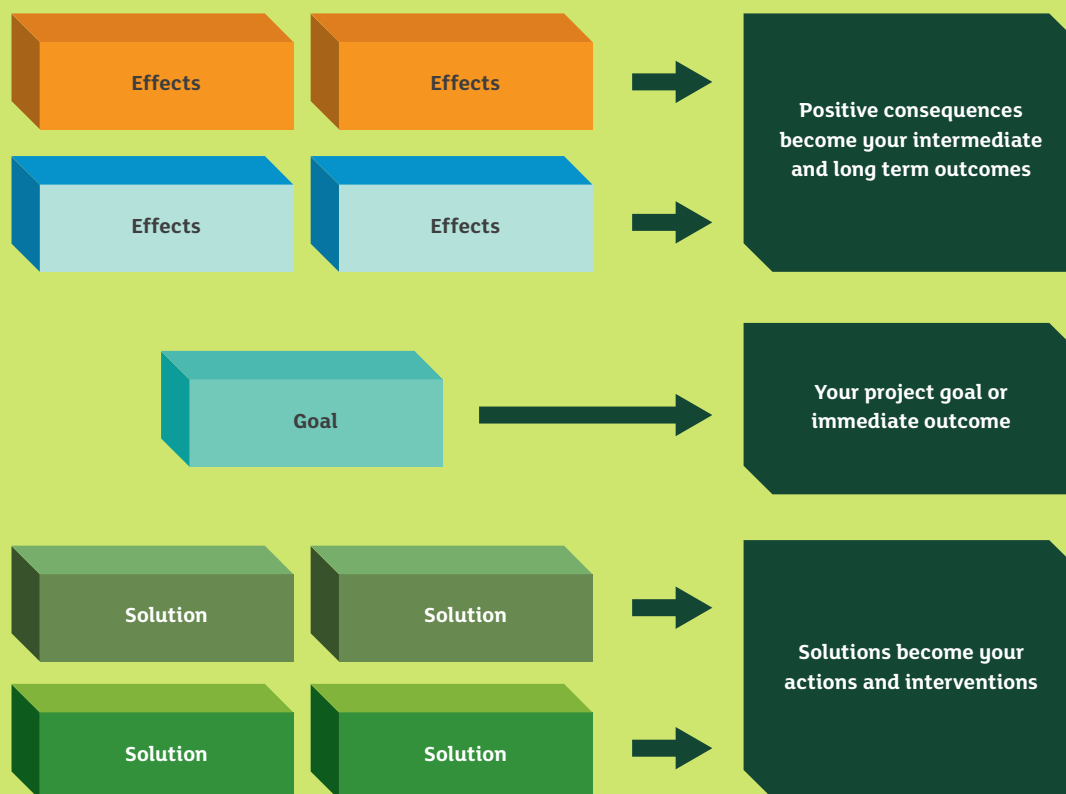
Figure 3
Use of solution tree to identify
opportunities and support project design

Stage 5: Use the solution tree to identify opportunities and support project design

Developing a solution tree helps to visualise possible actions and outcomes, and may present a number of separate or linked interventions to solve a problem. In this stage, participants discuss the possible actions identified in the solution tree to select preferred interventions, as illustrated in Figure 3.

Bear in mind that your selected intervention may not be able to tackle all of the causes identified in the analysis – consider project funding available, timeframes and relevance. It is also important to consider which solutions are within the scope of the Local Authority to affect and action, and which will require engagement and buy-in from other stakeholders.

Tips

+ The positive statements of the converted core problem and consequences can often be well worded as objectives for change, which can help in defining the vision for a particular project;

+ Before wrapping up the session, it can be valuable to consider initial next steps whilst key external stakeholders are in the room and engaged in the analysis. This might involve discussing the findings with any relevant colleagues who were unable to attend, especially those who would be involved in implementing any of the potential actions identified. Note down actions related to what has been discussed, any decisions made or information gaps identified, and follow up on them in the coming weeks.

Recommendations for effective problem/solution tree analysis

Use in the early stages of planning

Having a thorough and common understanding of key challenges underpins all stages of project planning from the choices of which interventions to explore and develop further – perhaps leading to actions for a city's SEAP – to decisions about which stakeholders to engage with, where to find data and strategies for gaining political or citizen support for an initiative. Therefore, it is worth using the tool early on in the planning process. This offers the additional benefit of providing an opportunity to start to engage with key stakeholders, to better understand their priorities and interests and build constructive collaborative working relationships, which is fundamental to effective project development.

Involve a mix of both internal and external stakeholders

Involving participants from outside your immediate project team allows for a better understanding of the challenge, incorporating different perspectives and interesting ideas, helping to give a more accurate reflection of the challenges a city is facing and to identify potential solutions which are achievable. The level of discussion undertaken during the workshop can also help to build better working relationships with stakeholders.

Tip

When inviting stakeholders to participate, explain the goals of the workshop and highlight the benefits for them – to gain a better understanding of what is being planned in the city; to provide their input into possible new initiatives; and to align strategies with existing or planned policies, strategies and projects which stakeholders are already involved with.

Factor in time to become familiar with the tool

Problem/solution tree analysis is not a complex tool to use, yet it can require time for project teams, and other workshop participants, to become familiar with it. If possible, allow time prior to running the workshop with wider stakeholders to have a short meeting with your immediate project team – give a brief overview of the purpose and step-by-step process, run through a few examples and discuss questions as they arise. In this way, those facilitating workshops in the future will be more confident in coordinating sessions and guiding people through the analysis, helping sessions to run smoothly and for outputs to be more constructive and focussed.

Have a designated facilitator

A facilitator has an important role in guiding a problem/solution tree analysis. The nature of the complex challenges being discussed means that it is easy for participants to get involved in in-depth conversations about specific issues and to get distracted from the main objectives of the session.

The role of a facilitator is to:

+ Keep discussions on track and on topic;
+ Ensure the pace of the workshop is appropriate to ensure that all stages of the analysis are completed in the time available; and
+ Ensure that participants are clear in the wording of problems, causes, consequences and solutions which are being put forward.

Tips

+ A facilitator doesn't need to have in-depth knowledge of the problem being discussed; the participants in the session will provide the information and details. However, it is important for the facilitator to have a good overview of the structure and process of a problem/solution tree analysis, to keep participants on track;
+ Depending on the number of people available in the session, your facilitator may also be your scribe – noting down the different causes and consequences as they are suggested. Questions such as 'how would you describe that?', 'is that the root cause?' and 'what does that have an impact on?' are very useful to ask participants.

Next steps

With the problem/solution tree analysis complete, what's next for your city? The challenges and opportunities identified through the problem/ solution tree analysis helped the STEP UP cities with two key activities:

+ Integrated project development; and
+ Enhanced SEAP development.

You may want to consider the potential for using the results in a similar way in your city.

Integrated project development

The opportunities emerging from the problem/solution tree analysis could be developed into innovative, integrated projects for your city.

STEP UP cities have used a variety of tools and methods to identify project opportunities and progress the development of innovative, integrated projects in their cities. Four key winning elements of successful projects have also been identified.

To find out more about these, the approaches used by cities and best practice examples, visit the City Projects area of the STEP UP website.

SEAP development

If you are working on developing a SEAP, or considering it, think about whether the project opportunities identified in the problem/ solution tree analysis could become actions in your SEAP, as a way to ensure key city challenges are addressed.

More information about the STEP UP approach to enhanced SEAPs is available on the project website, with information on tools used, key lessons and recommendations for other cities. This is being brought together in the STEP UP guidebook to developing an enhanced SEAP, available online from May 2015.

Political leadership with a long term approach

Business models that attract investment

Integrated projects:

Winning elements for success

Collaboration and dialogue with all stakeholders

Contribution to multiple policy objectives

Further information and resources for sustainable city planning

STEP UP

Downloadable resources, project updates from different cities and examples of other aspects of sustainable city planning and implementation in practice: **www.stepupsmartcities.eu**

Covenant of Mayors

Read existing SEAPs for cities across Europe, download a copy of the 'How to Develop a Sustainable Energy Action Plan' guidebook and view frequently asked questions from other Covenant signatories: **www.covenantofmayors.eu**

Scottish Cities Alliance

The Scottish Cities Alliance (SCA) is working with Scotland's cities to transition to a smart and low carbon economy, and supports STEP UP in promoting knowledge exchange and learning between Scotland and a network of cities across Europe:
www.scottishcities.org/low-carbon-economy

Sustainable Glasgow

Keep up-to-date with projects, events and sustainable city news in Glasgow: **www.glasgow.gov.uk/index.aspx?articleid=3377**

Sustainable Scotland Network

The Sustainable Scotland Network (SSN) has a range of information, resources and events designed to support the public sector in action on sustainable development:
www.keepscotlandbeautiful.org/ssn

University of Strathclyde's new Masters course in Global Sustainable Cities

This is an innovative programme focussed on tackling major urban opportunities and issues. Find out more about full-and part-time options at:
www.strath.ac.uk/courses/postgraduatetaught/ globalsustainablecities

STEP UP is focussing on holistic solutions for smart and sustainable city planning that deliver real environmental, economic and social benefits to cities and their inhabitants