Transport Pricing Guidance

Guidance for assessing the greenhouse gas impacts of transport pricing policies

May 2018

Overview of the methodology

3. OVERVIEW OF TRANSPORT PRICING POLICIES

Three recent major international agreements outline a collective strategy for sustainable development and climate change, and emphasise the urgency of action in the transport sector: the 2030 Agenda for sustainable development (2015), the Paris Agreement (2015) and the New Urban Agenda (2016). In order to meet the ambitious target set forth in the Paris Agreement to limit temperature increase to 1.5-2 °C above pre-industrial levels, the goal of the transport sector is to reduce emissions from 7.7 Gt per year to 2-3 Gt per year by 2050, with the greater goal of decarbonisation and transition to a “net-zero emission” economy, where remaining emissions from specific sectors are sequestered through other means.¹

3.1 Pricing policies

Because they provide additional benefits besides GHG emission reductions, transport system changes can be considered win-win GHG emissions reduction solutions. Policies and actions that provide sustainable development benefits can be justified even where they have relatively high costs per unit of emission reduction. For example, high quality public transit systems have high costs and low direct emission reductions. However, public transit provides other environmental, social and economic benefits, including reduced vehicle ownership and more compact urban development. On the other hand, some policies, such as fuel efficiency mandates and subsidies for alternative fuels, can have rebound effects. Rebound effects entail increased consumption resulting from actions that increase efficiency and reduce consumer costs. Certain policies may increase total vehicle travel and therefore external costs such as traffic and parking congestion, roadway infrastructure costs, accidents and sprawl.

In this guidance, the term price refers to the direct financial cost of using a good. Various price changes can affect the mode and frequency of travel, and subsequent fuel consumption and GHG emissions. In many countries, current prices often fail to reflect the marginal costs of transport activities, which is economically inefficient and unfair. For example, most roads and parking facilities are unpriced –

¹ SLoCaT 2017.
motorists use them on a first-come, first-served basis, which leads to traffic and parking congestion, and urban vehicle travel beyond what is economically optimal.

Similarly, vehicle insurance and registration fees are generally fixed costs. Motorists pay the same amount regardless of how many kilometres they drive each year, which tends to overcharge owners of lower-annual-vehicle-kilometre vehicles and undercharge higher-annual-vehicle-kilometre vehicles compared with the crash and roadway costs they result in. In addition, current prices often do not reflect external costs such as the health costs of air pollution or traffic accidents. Many of the policies covered in this guidance are therefore justified on basic economic and social equity principles (i.e., marginal-cost pricing and polluter pays), given that the factors discussed in Section 3.1.2 and 3.1.4 are considered.

3.1.1 Influence on travel and fuel consumption

Pricing policies vary in their travel impacts. When evaluating how a pricing policy affects travel and fuel consumption it is useful to consider how travellers actually perceive a price change. For example, a fuel price increase encourages motorists to drive less, to drive more efficiently (i.e., accelerating more smoothly and reducing speeds), and to choose more fuel efficient or alternative fuelled vehicles when possible. A high fixed vehicle fee, such as a distance-based registration fee or purchase tax, may encourage some households to reduce their vehicle ownership or purchase a lower-fee vehicle. High parking fees, in city centres and other locations, have been found to cause people to change how they travel (e.g., cycling, ridesharing or using public transit instead of driving), where they travel (e.g., from a city centre to other destinations with cheaper parking), where they park (e.g., to the fringe of the city centre where parking is cheaper), or to find ways to circumvent the fees (e.g., parking illegally). These factors are important to consider when evaluating a pricing policy’s costs and benefits.

Motor vehicles tend to have high fixed and low variable costs, so even though automobiles are expensive to own they are relatively inexpensive to use. A typical car costs several thousand dollars annually in fixed expenses (e.g., depreciation, financing, insurance, registration fees, maintenance and residential parking), but only about USD 0.20 per kilometre in variable expenses (e.g., fuel and tire wear). Adding a daily parking fee or road toll of USD 2.00 represents a relatively small increase in total vehicle costs, but doubles the variable costs for a commuter with a 10 kilometre round trip to work. Similarly, the impacts of a transit fare increase vary depending on a traveller’s travel mode, trip distances and income.

3.1.2 Factors to consider when planning and evaluating price changes

The impacts of pricing policies depend on how they are structured and how revenues are used. Pricing policies are more effective at reducing GHG emissions where revenues are used to improve low-carbon travel, such as through expanded pedestrian and cycling infrastructure) or public transit services. Where revenues are used to improve affordable travel options (e.g., walking, cycling and public transit) or used in other ways that benefit the poor, such as bus rapid transit systems funded by local fuel taxes or parking fees, pricing policies can be more effective at achieving social equity objectives.

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2 Litman 2016.

3 Examples provided throughout the guidance use USD as the currency, but are not specific to the United States. The given values are rough estimates that are not valid for every country.
The impacts of these policies depend on markets that change over time. For example, when choosing which vehicles to purchase, potential buyers may respond to fuel price increases by purchasing more efficient and alternative fuelled vehicles, or by choosing more city accessible homes that require less driving. In general, long-run elasticities are about three times as large as short-run elasticities. In the long-run, for example, where a fuel tax increase causes a 10% reduction in fuel consumption the first year, it should provide a 30% reduction over the long run (more than 5 years) if maintained in magnitude, accounting for inflation.¹ Travellers take higher prices into account when making durable decisions such as where to live and how many vehicles to own. For example, a household is more likely to decide to commute by transit and reduce their vehicle ownership after fuel prices have remained high for an extended period of time.

To maximise economic efficiency and minimise welfare losses, price changes are most effective when they are gradual and predictable, allowing the public to anticipate their impacts when making long term decisions. The availability of alternative travel options greatly amplifies the impacts of pricing policies.

Many pricing policies have rebound effects, where an increase in energy efficiency stimulates more vehicle travel which offsets some of the potential GHG emissions reductions or energy savings. The price elasticities in this guidance are based on empirically determined elasticities, and therefore do (to some extent) include rebound effects. It is important to keep in mind that such effects occur and can effect estimated GHG impacts of a policy.

3.1.3 List of pricing policies

Table 3.1 gives an overview of pricing policies in the transport sector and their vehicle travel and emissions impacts. The guidance is not applicable to every policy in this overview table. It is applicable to fuel subsidy reduction or removal, increased fuel tax or levy, road pricing policies and vehicle purchase incentives for more efficient vehicles, as explained in Chapter 1. For more detailed information on each of these policies, see Chapter 10 and Appendix C.

Table 3.1: Overview of pricing policies

<table>
<thead>
<tr>
<th>Policy</th>
<th>Description</th>
<th>Vehicle travel and emission impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced fuel subsidies</td>
<td>Removal or reduction of subsidies that reduce the price of vehicle fuel below its fair-market cost. Fuel can be considered highly subsidised if priced below international crude oil prices, and moderately subsidised if priced below fuel production and roadway costs</td>
<td>• Increased fuel prices may lead to reduced vehicle travel and/or increased switching to more efficient and alternative fuelled vehicles</td>
</tr>
<tr>
<td>Increased fuel tax/levy</td>
<td>Increased taxes may include general taxes that apply to many goods and special taxes specific to vehicle fuel</td>
<td>• Increased fuel prices lead to reduced vehicle travel and/or increased purchase of more fuel efficient and alternative fuelled vehicles</td>
</tr>
<tr>
<td>Carbon taxes</td>
<td>Carbon taxes are based on a fuel’s carbon content, and are therefore a tax on CO₂ emissions</td>
<td>• Increased fuel prices, with greater increases for more carbon-intensive fuels such as gasoline, lead to</td>
</tr>
</tbody>
</table>

¹ For more information on elasticities, see Appendix B for a list of literature
<table>
<thead>
<tr>
<th>Pricing Tool</th>
<th>Description</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased vehicle tax/levy</td>
<td>Fees on motor vehicle purchases and ownership, including high fees to ration or reduce vehicle ownership, high import duties on vehicles, vehicle taxes and fees that increase with vehicle weight, engine size or fuel intensity</td>
<td>• Very high vehicle ownership fees lead to reduced total vehicle ownership&lt;br&gt;• High duties on imported vehicles may encourage motorists to retain older and less efficient vehicles&lt;br&gt;• Taxes and fees that vary by vehicle weight, engine size or fuel intensity can encourage motorists to purchase smaller and more efficient vehicles&lt;br&gt;• Taxes and fees that vary by fuel type or that subsidise low-carbon fuel vehicles can encourage motorists to choose lower-carbon fuelled vehicles</td>
</tr>
<tr>
<td>Road pricing</td>
<td>Motorists pay directly for driving on a particular roadway in a particular area. Road pricing has two general objectives: revenue generation and congestion management</td>
<td>• Tolls reduce vehicle travel on affected roadways&lt;br&gt;• Congestion pricing reduces vehicle travel under congested conditions&lt;br&gt;• Overall impacts are modest because they only apply to a minor portion of total vehicle travel</td>
</tr>
<tr>
<td>More efficient parking pricing</td>
<td>Parking charges for motorists, and “cash out” parking so non-drivers receive comparable benefits</td>
<td>• Various impacts depending on conditions, including reduced vehicle ownership, modal shift, shift of destinations, shift in parking locations, shift to illegal parking</td>
</tr>
<tr>
<td>Distance-based vehicle insurance and registration fees</td>
<td>Vehicle charges are based on the amount a vehicle is driven during a time period. This includes pay-as-you-drive vehicle insurance, distance-based registration fees, distance-based vehicle purchase taxes, distance-based vehicle lease fees, weight-distance fees, distance-based emission fees</td>
<td>• Various impacts depend significantly on the policy and its conditions</td>
</tr>
<tr>
<td>Public transit fare reforms</td>
<td>Fare reforms include reduced fares, free transfers, universal transit passes and more convenient payment systems (e.g., passes, electronic payment cards or mobile telephone payment systems)</td>
<td>• Most transit travel has low price elasticities, but certain policies have relatively large impacts on travel (e.g., universal transit passes which can significantly increase transit travel)</td>
</tr>
<tr>
<td>Company car tax reforms</td>
<td>Reduced tax structures that encourage employers to subsidise employees’ car travel</td>
<td>• Reduced total vehicle travel and emissions, but reforms may also</td>
</tr>
</tbody>
</table>
3.1.4 Addressing social equity concerns

Pricing reforms are often criticised as regressive because they are believed to place a larger tax burden on lower-income rather than higher-income populations. However, this is not necessarily the case. This perception is based on the understanding that a given tax or fee represents a greater portion of income for a lower-income than a higher-income household, which would make the reform regressive. This is only the case where all households purchase the same transport-related goods and services. However, lower-income households have been shown to drive less and use less fuel than higher-income households. There are two general ways to evaluate pricing equity:

- **Horizontal equity** assumes that public policies should not favour one group over others, which implies that people should “get what they pay for and pay for what they get” unless subsidies are specifically justified. By this measure, transportation pricing tends to increase fairness and social equity, since it charges motorists directly for the roads, parking, accident risk, pollution and other costs they impose on other people.

- **Vertical equity** assumes that public policies should favour physically, economically or socially disadvantaged groups over more advantaged groups, for example through “progressive” price structures that charge less to disadvantaged people. Although transportation price increases often seem regressive, since a given tax or fee represents a larger portion for lower-income than higher-income households, they are generally less regressive than other transportation funding options, such as using general taxes to pay for roads, or incorporating parking facility costs into building rents. Since motor vehicle travel tends to increase with income, the distribution of road, parking and fuel subsidies tends to be regressive, that is, lower-income people receive far smaller subsidies than higher-income people.

Some of these subsidies are hidden and indirect, and careful analysis is needed to understand their equity impacts. For example, some countries subsidise vehicle fuel sales in various ways, and others apply low fuel taxes which represent a hidden subsidy of driving. In such cases it is necessary to calculate the total amounts of subsidy and under-taxing, analyse how these savings are distributed by income class, and estimate the tax reductions or additional public benefits that these subsidies could provide if redirected to lower-income households.

Transportation pricing can be very progressive (i.e., significantly benefits disadvantaged people) if it includes need-based subsidies or discounts, so disadvantaged people pay less than advantaged people, or if revenues are used in ways that benefit disadvantaged groups, for example to support inclusive and affordable transportation options (walking, cycling, public transit and universal design features), or to reduce more regressive taxes such as property and sales taxes. Other public policies can help achieve transportation equity, for example by developing affordable housing in accessible urban locations so
physically and economically disadvantaged residents can walk or bicycle to local services and jobs rather than needing to pay public transit fares.

3.1.5 Elements of successful pricing policies in the transport sector

There are several common elements of transport pricing policies that have proven effective in reducing GHG emissions, achieving sustainable development benefits and addressing social equity concerns. Pricing policies have proven most effective where policymakers:

- Account comprehensively for all significant sustainable development impacts and rebound effects so that all stakeholders understand the full benefits that result
- Address social equity concerns by using revenues in ways that benefit disadvantaged groups, including investments in affordable transport modes. In some cases, disadvantaged groups may receive direct subsidies, exemptions, discounts or rebates
- Implement pricing policies as an integrated package along with complementary and reinforcing transport and land use emission reduction strategies, such as improving low-carbon travel modes, and Smart Growth policies that support more compact urban development
- Implement pricing policies predictably and gradually, using comprehensive stakeholder consultations to improve them, increase their acceptance and incorporate inflation factors.

Generally speaking, fuel price increases at the national level may have a large GHG mitigation impact, but may also face strong political opposition. While planning for and assessing pricing policies, it is important to account for the earmarking of revenues, which may significantly influence the mitigation impact.

3.2 A national system for tracking the transport sector

Countries implement transport sector monitoring, reporting and verification (MRV) systems to support and improve policy planning, implementation and assessment activities with the underlying objective of enhancing the environmental, social and economic impacts of these policies. This section highlights the importance of transport sector MRV systems that enable policymakers to understand the total national GHG emissions in the transport sector and the impacts of the mitigation actions being implemented. For more information on and examples of MRV systems see the Reference Document on Measurement, Reporting and Verification in the Transport Sector.

3.2.1 Building and strengthening a national level transport sector MRV system

The specific nature of a MRV system depends on whether countries have committed to an economy-wide target, a sector-wide mitigation target or individual mitigation policies and/or actions. While the assessment of a sectoral mitigation target necessitates a full inventory of GHG emissions, the assessment of a specific mitigation policy or action involves the estimation of GHG emissions reductions within the GHG assessment boundary against a baseline scenario.

Transport GHG emissions can be quantified using two types of data: energy use (top-down) and travel activity (bottom-up). Bottom-up data allows users to quantify and monitor emissions from different policies and actions in much more detail. Where possible, these two approaches should be aligned, since consistency is necessary for many steps undertaken in the assessment.
Because the transport sector involves a diverse array of interconnected activities, including policies that directly and indirectly affect one or more of the components, resulting GHG emissions are dependent on the level of travel activity (A), the modal structure (S), the fuel intensity of each mode (I), and the fuel’s carbon content which determines the emission factor (F) that is used. The relationship between these different parameters is represented by the “ASIF” equation or “ASIF framework.” The ASIF framework used in the bottom-up approach establishes a connection between mitigation actions and GHG emissions, and helps users identify transport indicators for the assessment. For more information on the ASIF framework see the Reference Document on Measurement, Reporting and Verification in the Transport Sector.

When building or strengthening a national MRV system, it is important to consider national circumstances and capacity. When defining the type of data necessary to track policies, it is important to identify what data is needed, how data will be processed, and the responsible entities for the data collection, analysis and monitoring. Countries should use existing domestic arrangements, processes and systems already in place for data collection and management. Countries should establish new institutions where they are lacking.

3.2.2 Benefits of a robust national MRV system

A robust national transport MRV system has multiple benefits beyond the assessment of GHG emissions reductions tracking. A robust system supports policymakers and stakeholders in decision making by allowing them to:

- Identify national sectoral priorities and improve transport planning at the national and sub-national level
- Assess progress on transport policies being implemented and identify where to focus new GHG emissions reductions efforts
- Understand and evaluate the effectiveness of transport policies in achieving GHG emissions reductions and sustainable development objectives
- Improve efficiency by reducing redundancy in data collection and processing by establishing clear roles and responsibilities
- Ensure transparency, accuracy and comparability of information
- Assist different institutions with domestic and international reporting to the UNFCCC
- Communicate to donors on achievements made possible through their funding
- Attract additional public and private finance

3.2.3 Institutional setting for robust transport sector data

The institutional setting is a key component of a successful MRV system. Information on key performance indicators and parameters can be dispersed among a number of different institutions. Given the wide variety of data needed for impact assessment and the number of different stakeholders involved, strong institutional arrangements serve an important function. Institutions play a central role in collecting, processing and reporting relevant data. The institutional arrangements also depend on the scope of the MRV and whether it is of national or subnational actions (e.g., cities). Countries may already have
institutional arrangements in place to conduct these activities. Where this is the case, they can consider expanding their MRV system to monitor the impact of pricing policies.

A technical coordinator, coordinating team or body is often assigned to lead MRV processes in which responsibilities have been delegated to different institutions. Since data can be widely dispersed between these institutions, the coordinating body oversees the procedures for data collection, management and reporting. Users may find it helpful to identify, inform and consult stakeholders when setting up the coordination team and planning the assessment. Refer to the ICAT Stakeholder Participation Guidance for guidance on identifying and understanding stakeholders (Chapter 5), forming multi-stakeholder bodies (Chapter 6), providing information to stakeholders (Chapter 7), designing and conducting consultations (Chapter 8) and engaging in general with stakeholders throughout the entire impact assessment process.

The establishment of a data clearing house, or a virtual repository that collects and stores data, has proven useful for data management in several countries. In many cases, the clearing house is integrated into the country’s statistical bureau. The coordinating body may also oversee technical and institutional capacity building and monitor QC/QA standards with other participating institutions. This collaboration aims to maximise synergies, enhance efficiency and streamline the work between the institutions involved.

Where strong institutional arrangements do not yet exist, countries can determine and strengthen a governmental body to ensure it has the adequate capacity and authority to be responsible for the MRV system and establish appropriate legal arrangements. Institutional mandates help to strengthen the procedures and the system, and may also help secure funding from the government to ensure the continuity of the process. Users can refer to the UNFCCC Toolkit on Establishing Institutional Arrangements for National Communications and Biennial Update Reports, as well as Table 6 in the Reference Document on Measurement, Reporting and Verification in the Transport Sector, for support on establishing or improving the institutional arrangements for a robust MRV system.

4. USING THE GUIDANCE

This chapter provides an overview of the steps involved in assessing the GHG impacts of pricing policies, and outlines assessment principles that are intended to help guide the assessment.

Checklist of key recommendations

- Base the assessment on the principles of relevance, completeness, consistency, transparency and accuracy

4.1 Overview of steps

This guidance is organised according to the steps a user follows in assessing the impacts of a pricing policy. See Figure 4.1 for an overview of steps. Depending on when the guidance is applied and the approach chosen, users skip certain chapters.

Figure 4.1: Overview of steps

Part I: Introduction, objectives, steps and overview of transport pricing policies
Understand the purpose and applicability of the guidance (Chapter 1)
Determine the objectives of the assessment (Chapter 2)
Understand transport pricing policies (Chapter 3)
Understand assessment steps and principles (Chapter 4)

Part II: Defining the assessment
Clearly describe the policy to be assessed (Chapter 5)
Identify GHG impacts, define the GHG assessment boundary and assessment period (Chapter 6)

Part III: Assessing impacts
Calculate base year emissions using approach A, B or C and project baseline scenario (Chapter 7)
Choose price elasticity values and calculate GHG impacts using approach A, B or C (Chapter 8)
Assess GHG impacts ex-post (Chapter 9)

Part IV: Monitoring and reporting
Identify parameters and monitor the performance over time (Chapter 10)
Report the results and methodology used (Chapter 11)
4.2 Planning for the assessment

Users should review this guidance, the *Introductory Guide* and other relevant guidance documents, and plan the steps, responsibilities and resources needed to meet their objectives for the assessment in advance. Identify in advance the expertise and data needed for each step, plan the roles and responsibilities of different actors, and secure the budget and other resources needed. Any interdependencies between steps should be identified, for example where outputs from one step feed into another, and timing should be planned accordingly.

The time and human resources required to implement the guidance and carry out an impact assessment depend on a variety of factors, such as the complexity of the policy being assessed, the extent of data collection needed and whether relevant data has already been collected, whether analysis related to the policy has previously been done, and the desired level of accuracy and completeness needed to meet the stated objectives of the assessment.

4.2.1 Choosing a desired level of accuracy based on objectives

There are a range of options for assessing GHG impacts that allow users to manage trade-offs between the accuracy of the results and the resources, time, and data needed to complete the assessment, based on objectives. Some objectives require more detailed assessments that yield more accurate results (to demonstrate that a specific reduction in GHG emissions is attributed to a specific policy, with a high level of certainty), while other objectives may be achieved with simplified assessments that yield less accurate results (to show that a policy contributes to reducing GHG impacts, but with less certainty around the magnitude of the impact).

Users should choose approaches and methods that are sufficient to accurately meet the stated objectives of the assessment and ensure that the resulting claims are appropriate. For example, whether a policy contributes to achieving GHG emission reductions or whether emission reductions can be attributed to the policy. Users should also consider the resources needed to obtain the data needed to meet the stated objectives of the assessment.

4.2.2 Approaches for GHG impact assessment

The guidance outlines four principal steps for assessing the impacts of a policy, shown in Figure 4.2. Within each principal step, there are further steps users follow to calculate GHG impacts.

To assess a policy, Step 1 (choosing the approach for estimating the GHG impacts of the policy) starts in this section. To assess a vehicle purchase incentive or a road pricing policy, proceed directly to Chapter 10 for condensed guidance.

*Figure 4.2: Four key steps for assessing the impacts of pricing policies*
Chapters 7 - 9 provide guidance on estimating the GHG impacts of pricing policies, while approaches for other pricing policies are addressed in Chapter 10. The guidance provides three approaches for users. The choice of approach depends on the level of data available and the expertise of the user:

- **Approach A** estimates the GHG impacts of a pricing policy for the sum of gasoline and diesel related emissions from a country’s transport sector, and is appropriate for users with an undifferentiated fuel mix (national, subnational or municipal level).

- **Approach B** estimates the GHG impacts separately for gasoline and diesel fuelled vehicles for users with a differentiated fuel mix (national, subnational or municipal level).

- **Approach C** is not comparable to Approaches A and B. It estimates the GHG impacts for passenger transport separately for passenger cars, bus and rail-based public transport for users who have differentiated fuel mix data and data on passenger kilometres (PKM) and tonne kilometres (TKM). In the guidance, freight transport is excluded in order to keep the explanations and calculations simple. Users can apply the approach and include freight transport with TKM. However, when GHG impacts are assessed with Approach C as described in this guidance, the results will not reflect the same system boundaries and scope as Approaches A and B. Results from Approach C therefore provide a higher level of detail.

These approaches focus on gasoline and diesel. The same approaches could be used for other fuels (e.g., liquefied petroleum gas (LPG) or compressed natural gas (CNG)) by using analogous equations with different input data (i.e., travel activity data, emission factors and elasticity values).

The GIZ Reference Document on Measurement, Reporting and Verification in the Transport Sector (Section 2.1) defines two types of datasets: top-down “energy use” and bottom-up “travel activity” data. Approaches A and B are based on the top-down approach, while Approach C is based on both the top-down and the bottom-up approach.

**Comparison of the three approaches**

The three approaches lead to different results. As you move from Approach A to C, the level of detail necessary for the assessment increases (i.e., including electric vehicles in the assessment requires much more data), which has an impact on the results. GHG emissions reductions estimated with Approach A tend to be higher than with Approach B, since Approach A does not differentiate between the fuel types, and diesel fuel usually has a lower price elasticity than gasoline.

Approach C is not comparable to Approach A or B because it includes only passenger transport. Additionally, Approach C allows for the geographical system boundaries to be set for an urban context using rather than at the national level. By assessing several urban regions with Approach C, larger regions can be aggregated and analysed. It is also possible to apply two different approaches (e.g., Approach B on the national level and Approach C for an urban region) in order to conduct a national assessment while still gaining valuable insights on the impacts of模式 shift from Approach C. Through

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6 Passenger kilometres (PKM): Equals the numbers of passengers multiplied with kilometres travelled with a specific vehicle (vehicle kilometres). (e.g., if two people travel in one passenger car for 20 kilometres, this equals 2 pers. x 20 km = 40 PKM.)

7 Tonne kilometres (TKM): Same concept as for PKM, but for freight and using the tonne unit (e.g., if 3 tonnes of a good are transported over a distance of 20 kilometres in a heavy duty vehicle, this equals 3 t x 20 km = 60 TKM).
the use of cross-price elasticities, Approach C accounts for a decrease in the GHG emissions reductions related to modal shifts, which is not reflected in the results of Approaches A and B.

Table 4.1 provides an overview of the differences between Approaches A, B and C and helps users choose the most appropriate approach for their assessment.

*Table 4.1: Overview of approaches covered by the guidance*

<table>
<thead>
<tr>
<th>Approach</th>
<th>Data requirements</th>
<th>Boundaries / Coverage</th>
<th>Fuel types</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Geographical system boundaries</td>
<td>Passenger / Freight</td>
</tr>
<tr>
<td>Approach A</td>
<td>Only general fuel consumption data (Basis for calculation: top-down energy use data)</td>
<td>National, subnational or municipal</td>
<td>Ground transport (passenger and freight)</td>
</tr>
<tr>
<td>Approach B</td>
<td>Specific gasoline and diesel consumption data (Basis for calculation: top-down energy use data)</td>
<td>National, subnational or municipal</td>
<td>Ground transport (passenger and freight)</td>
</tr>
<tr>
<td>Approach C</td>
<td>Comprehensive bottom-up travel activity data (e.g., distance travelled by mode j) (Basis for calculation: top-down energy use and bottom-up travel activity data)</td>
<td>Regional, urban</td>
<td>Only passenger transport in an urban context However, the assessment can be conducted for several (large) cities to enable a more extensive geographical coverage</td>
</tr>
</tbody>
</table>

4.2.3 Methods for obtaining or estimating data

It is recommended that users use country-specific data. Where country-specific data are not available, default values can be used such as those provided by IPCC for emission factors and net calorific values (NCVs). For possible data sources for elasticity values see Appendix B. Section 7.2 and 7.3 briefly discuss how to include biofuels (e.g., bioethanol or biodiesel, possibly as proportions of fossil fuels) in the estimation.

For planning purposes, it is helpful for the user to identify the desired approach prior to beginning an impact assessment. The approach should be selected based on the user’s objectives, capacity and resources. If the user’s objective is to understand the impact of a policy and use that information to meet a variety of objectives—such as informing policy design, improving policy implementation, evaluating policy effectiveness, reporting on policy impacts, and attracting finance based on policy impacts—users should assess impacts using a more robust approach for assessing impacts and obtaining and estimating data.
4.2.4 Expert judgment

It is likely that expert judgment and assumptions will be needed in order to complete an assessment where information is not available or requires. Expert judgment is defined by the IPCC as a carefully considered, well-documented qualitative or quantitative judgment made in the absence of unequivocal observational evidence by a person or persons who have a demonstrable expertise in the given field. The goal is to be as representative as possible in order to reduce bias and increase accuracy. The user can apply their own expert judgment or consult experts.

When relying on expert judgment, information can be obtained through methods that are known as expert elicitation. The 2006 IPCC Guidelines for National Greenhouse Gas Inventories provides a procedure for expert elicitation including a process for helping experts understand the elicitation process, avoiding biases, and producing independent and reliable judgments.

Expert judgement can be associated with a high level of uncertainty. As such, experts can be consulted to provide a range of possible values and the related uncertainty range or they can be consulted to help select suitable values from a range of values. Expert judgement can be informed or supported through broader consultations with stakeholders.

It is important to document the reason that no data sources are available and the rationale for the value chosen.

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8 IPCC 2000.
4.2.5 Planning stakeholder participation

Stakeholder participation is recommended in many steps throughout the guidance. It can strengthen the impact assessment and the contribution of policies to GHG emission reduction goals in many ways, including by:

- Establishing a mechanism through which people who may be affected by or can influence a policy have an opportunity to raise issues and have these issues considered before, during and after policy implementation
- Raising awareness and enabling better understanding of complex issues for all parties involved, building their capacity to contribute effectively
- Building trust, collaboration, shared ownership and support for policies among stakeholder groups, leading to less conflict and easier implementation
- Addressing stakeholder perceptions of risks and impacts and helping to develop measures to reduce negative impacts and enhance benefits for all stakeholder groups, including the most vulnerable
- Enhancing the credibility, accuracy and comprehensiveness of the assessment, drawing on diverse expert, local and traditional knowledge and practices, for example, to provide inputs on data sources, methods and assumptions
- Enhancing transparency, accountability, legitimacy and respect for stakeholders’ rights
- Enabling enhanced ambition and financing by strengthening the effectiveness of policies and credibility of reporting

Various sections throughout this guidance explain where stakeholder participation is recommended—for example, in identifying a complete list of GHG impacts (Chapter 6), estimating baseline emissions (Chapter 7), estimating GHG impacts (Chapter 10), monitoring performance over time (Chapter 11), reporting (Chapter 12).

Before beginning the assessment process, consider how stakeholder participation can support the objectives and include relevant activities and associated resources in their assessment plans. It may be helpful to combine stakeholder participation for impact assessment with other participatory processes involving similar stakeholders for the same or related policies, such as those being conducted for assessment of sustainable development and transformational impacts, and for technical review.

It is important to ensure conformity with national legal requirements and norms for stakeholder participation in public policies, as well as requirements of specific donors and of international treaties, conventions and other instruments that the country is party to. These are likely to include requirements for disclosure, impact assessments and consultations, and may include specific requirements for certain stakeholder groups (e.g., UN Declaration of the Rights of Indigenous Peoples, International Labour Organisation Convention 169).

During the planning phase, it is recommended to identify stakeholder groups that may be affected by or may influence the policy. Appropriate approaches should be identified to engage with the identified stakeholder groups, including through their legitimate representatives. To facilitate effective stakeholder participation, consider establishing a multi-stakeholder working group or advisory body consisting of
stakeholders and experts with relevant and diverse knowledge and experience. Such a group may advise and potentially contribute to decision making to ensure that stakeholder interests are reflected in design, implementation and assessment of policies.

Refer to the ICAT Stakeholder Participation Guidance for more information, such as how to plan effective stakeholder participation (Chapter 4), identify and analyse different stakeholder groups (Chapter 5), establish multi-stakeholder bodies (Chapter 6), provide information (Chapter 7), design and conduct consultations (Chapter 8) and establish grievance redress mechanisms (Chapter 9). Appendix G summarises the steps in this guidance where stakeholder participation is recommended along with specific references to relevant guidance in the Stakeholder Participation Guidance.

4.2.6 Planning technical review (if relevant)

Before beginning the assessment process, consider whether technical review of the assessment report will be pursued. The technical review process emphasises learning and continual improvement and can help users identify areas for improving future impact assessments. Technical review can also provide confidence that the impacts of policies have been estimated and reported according to ICAT key recommendations. Refer to the ICAT Technical Review Guidance for more information on the technical review process.

4.3 Assessment principles

Assessment principles are intended to underpin and guide the impact assessment process, especially where the guidance provides flexibility. It is a key recommendation for the assessment to be based on the following five principles:9

- **Relevance**: Ensure the assessment appropriately reflects the GHG impacts of the policy and serves the decision-making needs of users and stakeholders, both internal and external to the reporting entity. Applying the principle of relevance depends on the objectives of the assessment, broader policy objectives, national circumstances, and stakeholder priorities.

- **Completeness**: Include all significant impacts in the GHG assessment boundary, including both positive and negative impacts. Disclose and justify any specific exclusions.

- **Consistency**: Use consistent assessment approaches, data collection methods, and calculation methods to allow for meaningful performance tracking over time. Document any changes to the data sources, GHG assessment boundary, methods, or any other relevant factors in the time series.

- **Transparency**: Provide clear and complete information for stakeholders to assess the credibility and reliability of the results. Disclose and document all relevant methods, data sources, calculations, assumptions, and uncertainties. Disclose the processes, procedures, and limitations of the assessment in a clear, factual, neutral, and understandable manner with clear documentation. The information should be sufficient to enable a party external to the assessment process to derive the same results if provided with the same source data. Chapter 11 provides a list of recommended information to report to ensure transparency.

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9 Adapted from WRI 2014
- **Accuracy**: Ensure that the estimated impacts are systematically neither over nor under actual values, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users and stakeholders to make appropriate and informed decisions with reasonable confidence as to the integrity of the reported information. If accurate data for a given impact category is not currently available, users should strive to improve accuracy over time as better data becomes available. Accuracy should be pursued as far as possible, but once uncertainty can no longer be practically reduced, conservative estimates should be used. Box 4.1 provides guidance on conservativeness.

In addition to the principles above, users should follow the principle of comparability if it is relevant to the assessment objectives, for example if the objective is to compare multiple policies based on their GHG impacts or to aggregate the results of multiple impact assessments and compare the collective impacts to national goals (discussed further in Box 4.2).

- **Comparability**: Ensure common methodologies, data sources, assumptions, and reporting formats such that the estimated impacts of multiple policies can be compared.

**Box 4.1: Conservativeness**

Conservative values and assumptions are those more likely to overestimate negative impacts or underestimate positive impacts resulting from a policy. Users should consider conservativeness in addition to accuracy when uncertainty can no longer be practically reduced, when a range of possible values or probabilities exists (e.g., when developing baseline scenarios), or when uncertainty is high.

Whether to use conservative estimates and how conservative to be depends on the objectives and the intended use of the results. For some objectives, accuracy should be prioritised over conservativeness in order to obtain unbiased results. The principle of relevance can help guide what approach to use and how conservative to be.

**Box 4.2: Applying the principle of comparability when comparing or aggregating results**

Users may want to compare the estimated impacts of multiple policies, for example to determine which has the greatest positive impacts. Valid comparisons require that assessments have followed a consistent methodology, for example regarding the assessment period, the types of impact categories, impacts, and indicators included in the GHG assessment boundary, baseline assumptions, calculation methods, and data sources. Users should exercise caution when comparing the results of multiple assessments, since differences in reported impacts may be a result of differences in methodology rather than real-world differences. To understand whether comparisons are valid, all methods, assumptions and data sources used should be transparently reported. Comparability can be more easily achieved if a single person or organisation assesses and compares multiple policies using the same methodology.

Users may also want to aggregate the impacts of multiple policies, for example to compare the collective impact of multiple policies in relation to a national goal. Users should likewise exercise caution when aggregating the results if different methods have been used and if there are potential overlaps or interactions between the policies being aggregated. In such a case, the sum would either over or underestimate the impacts resulting from the combination of policies. For example, the combined impact of a local energy efficiency policy and a national energy efficiency policy in the same
country is likely less than the sum of the impacts had they been implemented separately, since they affect the same activities. Chapter 4 provides more information on policy interactions.

In practice, users may encounter trade-offs between principles when developing an assessment. For example, a user may find that achieving the most complete assessment requires using less accurate data for a portion of the assessment, which could compromise overall accuracy. Users should balance trade-offs between principles depending on their objectives. Over time, as the accuracy and completeness of data increases, the trade-off between these principles will likely diminish.