

1 Chapter 11

3 **Sustainable Transport and Quality of Life**

5 *Linda Steg and Robert Gifford*

7
9
11 **11.1. Introduction**

13
15 Automobile use has greatly increased during the last few decades. The number of
17 passenger kilometers by private car per capita increased by 90 percent in Western
19 Europe and 13 percent in the US between 1970 and 1990. In 1990, the average
21 number of passenger kilometers travelled by private car in the US (18,650 km) was
23 more than double the Western European figure (8710 km; OECD, 1996). The number
25 of motorised vehicles in the world grew by about 600 million between 1950 and 1990.
27 Of the 675 million motorised vehicles in 1990, approximately 80 percent were for
29 passenger transport. However, the number of people in the world who do *not* own a
31 car increased even more in this period, by over 2 billion (Adams, 1999; OECD, 1996).
33 On a typical day in 1998, 75 percent of the adult population of Canada went
35 somewhere in a car, up from 70 percent in 1986 (Clark, 2000). In the Netherlands, the
37 number of car trips per person per day increased by 16 percent, while the number of
39 kilometers driven by car per day increased by 31 percent between 1985 and 1998
(Steg & Kalfs, 2000). Of further concern, drivers seem to expect they will take far
fewer trips than they actually do. When asked to prospectively estimate how many
trips they would take during the next week, Swedish drivers took 80 percent more
trips than they expected to (Jakobsson, 2004).

31 The increasing number of cars and their daily use causes various problems
(e.g., OECD, 1996; see also <http://home.connection.com/~regan/carcosts.htm> for
33 Canadian data and <http://www.rivm.nl/milieu/> for Dutch data). Many have stressed
35 that the current transportation system is not sustainable (e.g., OECD, 1996). Various
37 strategies have been proposed to achieve a more sustainable transport system,
ranging from behavioural to technological changes. Behavioural strategies are aimed
at reducing the level of car use, for example by shifting to less-polluting modes of
transport, changing destination choices, combining trips, encouraging car sharing

41 _____
Obstacles, Trends, Solutions

43 **Building Blocks for Sustainable Transport, Volume 1**

45 **Copyright © 2008 by Emerald Group Publishing Limited**

All rights of reproduction in any form reserved

DOI:10.1016/B978-0-08044-709-4.00011-2

1 (e.g., Katzev, 2003), or travelling less. These strategies may improve environmental
2 quality, urban quality of life (QoL), destination accessibility, and even health,
3 because, according to one study, each added daily hour spent in a car adds 6 percent
4 to one's chances of being obese (Frank, Andresen, & Schmidt, 2004).

5 Technological strategies attempt to reduce the negative impact per car and per
6 kilometer. Examples include increasing the energy efficiency of cars and developing
7 new forms of road pavement to reduce the level of traffic noise. Such solutions do not
8 appear to sufficiently reduce the problems of car use, so as to make it compatible
9 with sustainability (e.g., OECD, 1996). The mitigating effects of new technologies
10 tend to be overshadowed by the continuing growth of car use. Whereas new
11 technologies are capable of substantially reducing various emissions, other
12 sustainability problems such as urban sprawl and accessibility are rooted in a wider
13 complex of causes for which new technology *per se* is not a solution. For example,
14 energy-efficient cars may reduce environmental problems, but will not reduce
15 problems caused by accessibility to cars. Drivers might even be tempted to use their
16 energy-efficient cars more often because they are cheaper on fuel and more
17 environmentally friendly, a phenomenon known as the rebound effect (Berkhout,
18 Muskens, & Velthuisen, 2000) or the Jevons principle (OECD, 1996).

19 Behavioural and technological strategies not only differ in the extent to which they
20 may improve different sustainability aspects, but probably also in the extent to which
21 they affect individual QoL. In general, individuals prefer technological solutions to
22 behaviour change, because the latter are perceived as reducing one's freedom to move
23 (e.g., Poortinga, Steg, Vlek, & Wiersma, 2003). This may be explained by the
24 different psychological properties of the two strategies (Gardner & Stern, 1996).
25 Behavioural changes generally are associated with additional effort or decreased
26 comfort. For example, reducing car use implies a need to adjust one's lifestyle, which
27 may evoke resistance because it requires effort and reduces freedom, comfort, and
28 convenience. Many believe that technological measures require few behavioural
29 changes. For example, an energy-efficient car allows individuals to drive as much as
30 they always did, thereby significantly reducing adverse environmental impacts.
31 However, technological strategies generally require initial investments, and are
32 therefore often rather expensive in the short term, especially for low-income groups.
33 In the long term, technological improvements may be beneficial because of energy
34 (and consequently cost) savings. Although technological measures usually are
35 preferred to behavioural changes, many also believe that reductions in the volume of
36 car use are needed to manage the problems caused by traffic and transport, and that
37 technological solutions will not be sufficient to solve these problems (e.g., Steg &
38 Sievers, 1996). Thus, many drivers agree that car use should be reduced in order to
39 manage transport problems, but they are not in favour of measures that restrict their
40 own car use.

41 The current transport system is not sustainable. However, little is known about
42 which kind of transport system would be sustainable, or even which criteria for
43 sustainability should be used. In this chapter, we describe possible ways to examine
44 whether transportation systems are sustainable, taking into account individual as
45 well as collective interests. This chapter focuses on private transport, especially car

1 use. The following section reviews methods for assessing sustainable transport. Next,
2 we introduce a method for assessing the QoL effects of transport plans. This method
3 enables the examination of the degree to which sustainable transport is acceptable to
4 the public. Psychological factors that affect individual QoL judgments and the
5 acceptability of transport plans are then briefly reviewed. Finally, some conclusions
6 and the practical value of instruments for assessing sustainable transport are offered.

11.2. Sustainable Transport

11 Although no common accepted definition of sustainability exists, definitions of
12 sustainable development or sustainable transport are available (Beatley, 1995).
13 Sustainable development, and more specifically, sustainable transport, implies
14 finding a proper balance between current and future environmental, social, and
15 economic qualities (e.g., OECD, 1996; Ruckelhaus, 1989; Litman, 2003; WCED,
16 1987). Which environmental, social, and economic qualities should be guaranteed
17 and balanced is less clear. Although various attempts have been made to define
18 sustainable transport indicators (see below), a set of indicators that adequately
19 reflects environmental, social, and economic qualities has not yet been identified.
20 Ideally, theory-based conceptions and operationalisations of sustainable transport
21 indicators should be developed, first by defining sustainable transport, and then by
22 deriving significant performance indicators that enable us to measure sustainable
23 transport. At present, many performance indicators have been derived from current
24 practices (e.g., in transport plans and policies) and stakeholder perceptions of
25 sustainable transport. Indicator development often has not been based on an explicit
26 definition or vision of sustainable transport (Gilbert & Tanguay, 2000).

27 Sustainable transportation might be considered by examining the sustainability of
28 the transport system itself, focusing on the positive and negative values and
29 externalities of traffic and transport as they are apparent now or in the near future.
30 These kinds of indicators have been used by governments (e.g., Department for
31 Transport, 2004; V&W, 1991; see also Gilbert & Tanguay, 2000; Gudmundsson,
32 2001) to set sustainable transport goals and to monitor whether the current transport
33 system is moving towards sustainability. In some cases, future projections are also
34 made, to forecast developments in transport and relevant sustainability indicators
35 (e.g., RIVM, 2000). Various attempts have been made to list such indicators (e.g.,
36 Gilbert & Tanguay, 2000; Gudmundsson, 2001; Litman, 2003). Some examples are
37 energy use, CO₂ emissions, emissions of toxic and harmful substances, land use,
38 disruption and fragmentation of natural areas, waste, traffic safety, noise pollution,
39 health consequences of transport, crash costs, the contribution of the transport
40 sector to economic welfare, and accessibility. Also, indicators have been defined that
41 are based on the quality of the current transport system, including commuting speed,
42 congestion delay, variety and quality of transport options available in a community,
43 accessibility of activities (for drivers and non-drivers), and the proportion of
44 household expenditures devoted to transport (e.g., Litman, 2003).

1 One may also assess the effects of possible future transport systems on sustainable
2 development in general. In this case, a broader range of sustainability indicators may
3 be considered. Changes in the transport sector may induce changes in various other
4 sectors, which in turn may affect sustainable development. For example, they may
5 induce macroeconomic changes (e.g., lower production values in transport, and
6 higher production values in trade and industry), resulting in changes in GDP and
7 employment levels (Geurs & Van Wee, 2000). Thus, valid sustainability indicators
8 are needed to examine the extent to which possible future transport systems affect
9 sustainable development. Various methods and models have been developed to assess
10 environmental, social, and economic effects of transport plans (see Geurs & Van
11 Wee, 2003, for an overview). These models need improvement. In particular, social
12 indicators are rarely included, because of a lack of knowledge and rigorous methods,
13 tools, and techniques for assessing the social impact of transport changes.

14 Sustainability indicators are needed to examine possibilities and conditions for
15 sustainable transportation. The extent to which various sustainable policies would
16 affect important sustainable transport indicators should be assessed by systematically
17 examining the economic, social, and environmental effects of these transport
18 systems. Economic indicators should measure possible effects on economic welfare,
19 such as macroeconomic changes, GDP, economic efficiency, income distribution,
20 and unemployment rates. Social indicators should reflect effects on societal and
21 individual QoL, such as health and safety (e.g., OECD, 1976, 1982). Environmental
22 indicators should measure effects on environmental qualities, such as resource use,
23 emissions and waste, and the quality of soil, water, and air that may affect human
24 (and non-human) life (e.g., OECD, 2002; Steg et al., 2003).

25 Geurs and Van Wee (2000) examined whether various future transport scenarios
26 would be sustainable. First, they defined environmentally sustainable transport
27 criteria, such as emissions of CO₂, NO_x, VOS, particles, noise, and land use. Second,
28 they defined three environmentally sustainable transport scenarios that would meet
29 these criteria, following a backcasting method: a high-technology scenario (only
30 technological changes), a mobility-change scenario (only behaviour changes aimed to
31 reduce car dependency), and a combination scenario (technological and behavioural
32 changes). Next, they examined which policy measures would have been needed to
33 reach these environmentally sustainable transport systems. Moreover, they explored
34 possible economic and social consequences of the combination scenario, which they
35 compared to the economic and social consequences of a business-as-usual scenario.
36 The social impacts were qualitatively assessed by experts. Their study revealed that
37 environmentally sustainable transport goals can be met only if a large increase in
38 technological development is assumed, and/or very stringent behavioural adapta-
39 tions and changes in spatial and economic structures are assumed. Moreover, Geurs
40 and Van Wee concluded that the current policy life cycle should change radically to
41 bring about the timely implementation of relevant policy measures. The economic
42 and social consequences of environmentally sustainable transport scenarios appeared
43 to be less drastic than is often assumed. However, they focused on social indicators
44 that are threatened by motorised transport, such as safety, health, perceived
45 environmental qualities, and community relationships. Other probably important

1 social indicators, such as equity, freedom, convenience and comfort, may be
2 threatened if sustainable transport were in place, especially for groups that are forced
3 to reduce their car travel.

4 Prescriptive studies like these are important for examining whether and how
5 sustainable transportation systems are feasible. They clarify what a sustainable
6 future might look like. Of course, the next important questions are: How does the
7 public evaluate such sustainable futures? Is a sustainable transport system widely
8 acceptable? The answers will depend, among other things, on the extent to which
9 members of the public believe that these futures result in an increase or decrease of
10 their QoL.

11 Improvements in collective qualities of life, as attempted through sustainable
12 transport, may conflict with individual short-term interests, especially when
13 individuals must adapt their lifestyles in order to reach the sustainability goals.
14 Thus, collective and individual interests may be at odds. In fact, this is often the case
15 with sustainable transport issues. For that reason, problems caused by traffic and
16 transport may be defined as a typical example of a social dilemma. To achieve a
17 sustainable transport system, drivers may have to drive less. However, from an
18 individual point of view, continuing to drive may be more attractive because of the
19 many advantages of individual car use. For many, driving a car is much more
20 attractive than are other modes of transport. The car is especially attractive because
21 of its convenience, independence, flexibility, comfort, speed, perceived safety, and
22 privacy. The car also provides more status and pleasure than other modes of
23 transport; it is a means of self-expression, and enables one to control a powerful
24 machine (e.g., Reser, 1980; Steg, 2003a, 2003b). Thus, improved QoL for most
25 citizens may imply that drivers forfeit some of the individual advantages of car use,
26 which may (at least initially) be perceived as a threat to their individual QoL. This
27 may be especially difficult when most citizens are, in fact, also drivers. In such
28 situations, many are tempted to act in their own interest, especially because this
29 results in immediate gratification, whereas the collective problems will be visible only
30 in the long term. Moreover, individuals themselves cannot control the problems
31 caused by car use; the problems will be solved only if many individuals cooperate.
32 For many, it does not seem sensible to forego the individual advantages of car use
33 because of the uncertainty about whether others also will do so. However, various
34 factors may encourage people to act in the common interest, even though doing so
35 may not have immediate positive consequences for themselves. Some of these factors
36 include problem awareness (e.g., Nordlund & Garvill, 2003; Steg & Vlek, 1997),
37 perceived responsibility for the problems, trust in others' contributions, considera-
38 tion of future consequences (Joireman, Van Lange, & Van Vugt, 2004) and personal
39 norms (see Gifford, 2001, and Steg, 2003c, for extensive overviews).

40 From these considerations, one may conclude that the sustainability of different
41 transport scenarios for society at large should be examined (e.g., by investigating the
42 effects of possible future transport systems on sustainable development in general).
43 One also may conclude that whether such scenarios are acceptable to the public
44 should be examined, and why, especially when significant changes in travel behaviour
45 are needed to achieve transportation sustainability. More specifically, knowing which

1 factors cause which scenarios to have low public acceptance would be important.
 2 This will depend on, among other things, the extent to which members of the public
 3 expect that the scenarios would affect their QoL. Obviously, one can hardly expect
 4 sustainable transport to work if most citizens believe it will significantly reduce their
 5 QoL. The Brundtland Commission Report also implies the importance of QoL in its
 6 definition of sustainable development: “meeting the needs of the present without
 7 compromising the ability of future generations to meet their own needs” (WCED,
 8 1987, p. 43). This definition emphasises that “quality of life” depends on the extent to
 9 which current and future generations are able to fulfil their needs. Thus, sustainable
 10 transport must also be concerned with human needs and values. Needs refer to
 11 internal forces that drive individual actions (e.g., Maslow, 1954), whereas values refer
 12 to desirable transsituational goals that vary in importance, which serve as guiding
 13 principles in the life of a person or other social entity (Schwartz, 1992). In contrast to
 14 needs, values are tied to a normative base involving evaluations of goodness and
 15 badness (e.g., Feather, 1995). The satisfaction of needs and the fulfillment of values
 16 both are important to QoL, and so the effects of strategies aimed at creating
 17 sustainable transport should be assessed in terms of both needs and values. The next
 18 section describes a measurement instrument for assessing quality-of-life effects of
 19 more sustainable transport scenarios of the future.

21

23

25 **11.3. Sustainable Transport and Quality of Life**

26 QoL is a multidimensional construct, and may be defined as the extent to which
 27 important values and needs of people are fulfilled (e.g., Diener, 1995; Diener, Suh,
 28 Lucas, & Smith, 1999). QoL refers to well-being, conceptualized either as the
 29 objective conditions of living of an individual, as the person’s experience of life, or
 30 both. This chapter focuses on subjective well-being, that is, individuals’ cognitive and
 31 affective evaluations of their lives (Diener, 2000).

32 Based on an extensive literature review of needs, values, and human well-being, a
 33 list of QoL indicators has been developed and used in various research projects on
 34 sustainable household consumption at the University of Groningen. These indicators
 35 are believed to represent a wide range of non-overlapping dimensions that are
 36 important to consumers and, by extension, travellers (see De Groot & Steg, 2005;
 37 Gatersleben, 2000; Poortinga et al., 2001; Poortinga, Steg, & Vlek, 2004; Skolnik,
 38 1997; Slotegraaf & Vlek, 1996; Steg et al., 2002; Vlek, Skolnik, & Gatersleben, 1998;
 39 Vlek, Rooijers, & Steg, 1999). Table 11.1 presents the most recent version of these
 40 QoL indicators. Although the list of QoL indicators in Table 11.1 is believed
 41 complete, or nearly so, additions and changes may be needed. Note that when these
 42 constructs are assessed by consumers in terms of their importance, as in Table 11.1,
 43 they reflect their origins in terms of constructs as needs or values. However, when
 44 respondents are asked how well each construct is satisfied or fulfilled in their lives,
 45 they may be viewed as QoL measures.

1 Table 11.1: Description and importance ratings of 22 quality-of-life indicators.

3	QoL-Indicator	Description	M
5	Health	Being in good health. Having access to adequate health care	4.9
7	Partner and family	Having an intimate relationship. Having a stable family life and good family relationships	4.7
9	Social justice	Having equal opportunities and the same possibilities and rights as others. Being treated in a just manner	4.7
11	Freedom	Freedom and control over the course of one's life, to be able to decide for yourself, what you will do, when and how.	4.5
13	Safety	Being safe at home and in the streets. Being able to avoid accidents and protected against criminality	4.5
15	Education	Having the opportunity to get a good education and to develop one's general knowledge.	4.3
17	Identity/self-respect	Having sufficient self-respect and being able to develop one's own identity.	4.2
19	Privacy	Having the opportunity to be yourself, to do your own things and to have a place of your own	4.2
21	Environmental quality	Having access to clean air, water and soil. Having and maintaining good environmental quality	4.2
23	Social relations	Having good relationships with friends, colleagues and neighbours. Being able to maintain contacts and to make new ones	4.2
25	Work	Having or being able to find a job and being able to fulfil it as pleasantly as possible	4.2
27	Security	Feeling attended to and cared for by others	4.1
29	Nature/biodiversity	Being able to enjoy natural landscapes, parks and forests. Assurance of the continued existence of plants and animals and maintaining biodiversity	4.1
31	Leisure time	Having enough time after work and household work and being able to spend this time satisfactorily	4.0
33	Money/income	Having enough money to buy and to do the things that are necessary and pleasing	3.6
35	Comfort	Having a comfortable and easy daily life	3.5
37	Aesthetic beauty	Being able to enjoy the beauty of nature and culture	3.5
39	Change/variation	Having a varied life. Experiencing as many things as possible	3.3
41	Challenge/excitement	Having challenges and experiencing pleasant and exciting things	3.2
43	Status/recognition	Being appreciated and respected by others	3.0
45	Spirituality/religion	Being able to live a life with the emphasis on spirituality and/or with your own religious persuasion	2.9
	Material beauty	Having nice possessions in and around the house	2.6

Source: Adapted from Poortinga et al. (2004).

1 The data in Table 11.1 are from a questionnaire study of 455 Dutch respondents
 2 in 1999; scores could range from 1 “not important” to 5 “very important” (see
 3 Poortinga et al., 2001, 2004, for more details).

4 Table 11.1 reveals that most QoL indicators are considered to be very important
 5 to people’s lives. This is not surprising, because these QoL indicators are based on
 6 important needs and values. However, Table 11.1 shows that some QoL indicators
 7 are valued more than others. Health, partner and family, social justice, freedom, and
 8 safety are valued more highly (at least were by Dutch people in 1999) than material
 9 beauty, spirituality and religion, status and recognition, and challenge and
 10 excitement. Policy-makers should give more attention to possible impacts on the
 11 most important QoL indicators when they design and implement sustainable
 12 transport policies, because the public can be expected to more strongly oppose
 13 measures that negatively affect these QoL indicators. Policy-makers may need to
 14 search for ways to achieve sustainable transport that would affect these QoL
 15 indicators in less negative ways, or even in positive ways. They might also consider
 16 possible ways to compensate any expected negative effects.

17 18 19 *11.3.1. Assessing Quality of Life Effects*

20 QoL effects of transportation scenarios or plans may be assessed by asking
 21 respondents to indicate the extent to which varying sustainable transportation
 22 scenarios would affect relevant QoL indicators in positive or negative ways. To
 23 obtain a more precise view of these effects, these expected changes may be weighted,
 24 based on importance judgments of the relevant QoL indicators, because changes in
 25 more-important QoL indicators presumably will be more significant for individuals
 26 than will changes in less-important QoL indicators. Subsequently, the overall
 27 expected changes in QoL may be calculated. A multi-attribute QoL scale may then be
 28 created by summing the expected changes on the QoL indicators, each multiplied by
 29 the importance judgment assigned to it.

30 The QoL instrument has been successfully used in several studies of sustainable
 31 household consumption. For example, Vlek et al. (1998) examined which QoL changes
 32 respondents would expect from future economic and environmental improvements or
 33 deteriorations. Dutch respondents evaluated three different scenarios. Various
 34 negative QoL changes were expected when environmental conditions deteriorated
 35 under either an improved or deteriorated economy. In particular, environmental
 36 quality, nature, health, aesthetic beauty, and safety were expected to be threatened
 37 when environmental conditions deteriorated. In contrast, the respondents expected
 38 mixed positive and negative changes in QoL when economic conditions deteriorated
 39 under improved environmental quality. More specifically, positive changes were
 40 expected in environmental quality, nature, safety, and health, whereas negative
 41 changes were expected in comfort, money, material beauty, and work.

42 In a second study, Gatersleben (2000) examined how the QoL of Dutch households
 43 would be affected if residents were required to reduce their energy use to a sustainable
 44 level.

1 level. Study participants first indicated which energy savings they would choose to
2 reach a sustainable consumption level. Next, they indicated to what extent this would
3 result in changes in 16 QoL indicators. Reductions in freedom, comfort, pleasure,
4 social relations, work, and leisure time were expected, as were minor reductions in
5 privacy and social justice. Improvements in environmental resources, quality of
6 nature, income, safety, and recognition were expected. Few changes were expected in
7 material beauty, education, and health. The more respondents expected energy
8 savings to have negative effects for health, social justice, leisure time, and freedom,
9 and the less they expected negative effects for privacy, the more they believed that the
10 quality of their life in general would be reduced.

11 In a third study, Poortinga et al. (2001) examined the extent to which sustainable
12 household energy consumption scenarios would affect judged QoL. Scenarios were
13 presented that systematically varied on three dimensions: the focus of energy saving
14 (home versus transport), the means of energy saving (technical innovations,
15 behaviour changes, or a combination of both), and the amount of energy saved
16 (20 percent versus 30 percent). Dutch respondents reported which QoL changes
17 would be expected from the scenarios. For present purposes, the expected QoL
18 changes from the transport scenarios are most relevant. In general, the transport
19 scenarios were expected to result in a reduction in comfort, work, money, privacy,
20 and freedom, whereas improvements were expected in nature/biodiversity and
21 environmental qualities. Overall QoL was not much affected, which implies that the
22 expected improvements nearly compensated for the expected reductions in QoL. The
23 respondents expected most negative consequences from the transport scenario that
24 involved technological as well as behavioural changes that would result in small
25 energy savings. The multi-attribute QoL measure appeared to be significantly
26 correlated with an intuitive measure of expected QoL changes (i.e., respondents
27 indicated to what extent their QoL would change if the scenario were implemented).

28 Fourth, Steg et al. (2002) asked respondents to indicate how and to what extent
29 their QoL was affected by reducing their household energy use. In this study, Dutch
30 households were asked to (voluntarily) reduce their household energy use by at least 5
31 percent. Each household received tailored information about possible ways to reduce
32 their household energy use. They also received feedback about the amount of energy
33 saved. Before the experiment, respondents expected improvements in environmental
34 qualities and in nature and biodiversity when they reduced their energy use by about 5
35 percent, whereas few changes were expected on the other 20 QoL indicators listed in
36 Table 11.1. One month after the experiment started, households indicated to what
37 extent their QoL had actually changed because of their attempts to reduce energy use.
38 They reported improvements in environmental quality and in nature and biodiversity.
39 No changes in the other QoL indicators were reported.

40 Finally, in a study by De Groot and Steg (2005), study participants in five
41 European countries (i.e., Austria, the Czech Republic, Italy, Sweden, and the
42 Netherlands) evaluated the extent to which a doubling of the costs of car use would
43 affect their QoL. Respondents indicated to what extent their overall QoL would be
44 affected, as well as to what extent the policy would affect 22 QoL indicators. In
45 general, respondents anticipated negative effects for the QoL indicators comfort,

1 money and income, leisure time, change and variation, freedom and work, but they
 2 thought the QoL indicators environmental quality, nature and biodiversity, and safety
 3 would improve. Some interesting differences between the five countries were found. In
 4 general, respondents from the Czech Republic and Italy expected the negative QoL
 5 effects to be weaker than did the Dutch, Swedes, and Austrians. Also, respondents
 6 from the Czech Republic, Italy, and Austria expected the positive QoL effects to be
 7 more significant than the Dutch and Swedes. Again, the total expected change in QoL
 8 (i.e., the sum of expected positive and negative changes) was correlated with the
 9 expected changes in overall QoL (i.e., an intuitive measure of QoL).

11

13 *11.3.2. Factors Influencing Judgments of QoL Effects*

15 Based on these studies, we believe that the QoL concept is useful for assessing
 16 expected effects of future scenarios. They not only reveal whether people believe that
 17 QoL would be affected by various transport plans, but also how it would be affected,
 18 i.e., which QoL indicators would improve and which would deteriorate. The studies
 19 reveal that deteriorations in specific QoL indicators may be compensated for by
 20 improvements in other dimensions. Clearly, sustainable scenarios typically threaten
 21 personal QoL indicators such as comfort, freedom, and privacy, while QoL
 22 indicators that refer to societal indicators such as environmental quality and nature
 23 and biodiversity would improve. This once again illustrates the conflict between
 24 individual and collective interests, and demonstrates that individual and collective
 25 interests must be balanced.

27 Most of the five studies reported above (except Steg et al., 2002) examined only
 28 anticipated changes in QoL, i.e., respondents indicated to what extent they expected
 29 their QoL to be affected in such cases. These may differ from actual QoL changes
 30 that would occur when the proposed changes would be implemented. For example,
 31 studies of the acceptability of transport policies have shown that public support may
 32 be higher after transport policies have been implemented (Tretvik, 2003; see also
 33 Steg, 2003b). This may occur when respondents' opinions are better informed after
 34 policy implementation, because they have more experience with the pros and cons of
 35 the measures. For example, a study by Heath and Gifford (2002) revealed that
 36 attitudes toward bus-riding improved and bus-riding increased after the implementa-
 37 tion of a U-Pass that allowed free bus transport for students after a mandatory
 38 addition to their University tuition fees. Individuals may also become more
 39 convinced of the advantages of the new policies because they perceive that collective
 40 problems are being solved.

41 Changes typically are resisted at first, because they *may* have negative
 42 consequences. As long as individuals are unsure of the consequences, they prefer
 43 the status quo (Kahneman & Tversky, 1984). Similar processes may play a role when
 44 people are asked to assess which changes in QoL they would expect from future
 45 transport scenarios. Therefore, the QoL concept should also be used to monitor QoL
 over time, to examine the extent to which changes in society or in transport affect

1 judged QoL. This highlights the importance of the way in which future scenarios are
2 presented. To ensure that respondents provide well-considered judgments of
3 expected QoL effects of transport plans, the plans should be described in plausible
4 and imaginable ways. Clear description of proposed changes in the transport system
5 is important for helping respondents to think through the possible consequences of
6 the plans for themselves. The public should also be involved in the development of
7 sustainable transport plans. This should result in better and more acceptable
8 sustainable transport plans.

9 The research methods described above are based on a *compensatory* decision-
10 making model. Individuals may use other decision rules when they evaluate future
11 scenarios. Whether drivers or other concerned individuals are “involved” in (that is,
12 actively considering) the issue of sustainable transport may invoke different models of
13 how proposed alternatives are evaluated (e.g., Greenwald & Leavitt, 1984). When
14 individuals *are* involved, compensatory models like the multi-attribute model
15 described above may best describe their evaluations of transport alternatives presented
16 to them. Involved persons are able and willing to consider trade-offs between less-
17 desirable and more-desirable consequences of scenarios presented to them.

18 However, many persons have little cognitive or emotional involvement in transport
19 issues. For them, a variety of *non-compensatory* models may better describe their
20 evaluation of alternatives, because they have limited beliefs and limited knowledge,
21 and care little for the issues. For example, their evaluations may be better predicted by
22 conjunctive or disjunctive rules. When a conjunctive rule is used, the person rejects any
23 alternative that does not meet all his or her minimum criteria for acceptability. When a
24 disjunctive rule is used, the person accepts any alternative that meets or surpasses any
25 of his or her criteria. Individuals may also use “fast and frugal” criteria when they are
26 less involved (Gigerenzer & Todd, 1999); transport users have many things on their
27 minds in their daily lives besides sustainability, and typically must be “cognitive
28 misers” (Fiske & Neuberg, 1990) to survive and prosper. Future research should
29 examine whether level of involvement indeed affects the evaluation of transport
30 scenarios. The results of the studies discussed above suggest that a compensatory
31 model may be appropriate to describe evaluations of QoL effects of policies, at least
32 when a study or everyday circumstances bring the issues into the consumer’s active
33 consideration, because overall scores on expected changes in QoL (i.e., the weighted
34 sum of expected positive and negative changes) appeared to be correlated with an
35 intuitive measure of expected QoL changes (i.e., an overall judgement of expected QoL
36 effects). This implies that expected negative changes in QoL indicators may indeed be
37 compensated by expected positive changes in other QoL indicators.

38 A few other factors should be considered when examining QoL effects of
39 sustainable transport scenarios. General subjective well-being has not changed much
40 over the last several decades, even though incomes and consumption levels have
41 increased significantly (Diener et al., 1999; Veenhoven, 2004). Individuals seem to
42 adapt to positive as well as to negative changes in their lives; they change their
43 expectations and goals (e.g., Diener, 2000; Meyers, 1992; Suh, Diener, & Fujita,
44 1996). QoL is judged in comparison to some social or personal standard (Diener,
45 2000; Ormel, Lindenberg, Steverink, & Vonkorff, 1997). People seem to feel more

1 satisfied with their lives when they believe they are better off than others are, when
 2 they are better off than yesterday, or when they are closer to their aspirations. These
 3 standards, which are used to judge QoL, do change over time, i.e., individuals appear
 4 to adapt their comparative standards to changes in their circumstances (which might
 5 improve or deteriorate). This implies that further increases in consumption levels,
 6 including transport, will not necessarily enhance QoL, and reductions in consump-
 7 tion and transport levels may not necessarily reduce QoL. Although individuals may
 8 initially experience a reduction in QoL, they may well adapt soon after the changes
 9 (Diener, 2000). Thus, the conviction of many politicians that a truly sustainable
 10 transportation system is not feasible because environmentally sound transportation
 11 systems will seriously threaten QoL may not be correct, and should at least be tested.

AU:2

12 Theories of QoL and human well-being typically assume that a general set of
 13 indicators for QoL can be defined that does not differ over time or between cultures
 14 (e.g., Maslow, 1954; Max-Neef, 1992; Rokeach, 1973; Schwartz, 1992; Schwartz &
 15 Bilsky, 1987, 1990; see Vlek et al., 1999, for a review). However, the way individuals
 16 prefer to fulfil their needs and values does change over time and differs between
 17 cultures. Moreover, the relative importance of various QoL indicators (or needs and
 18 values) differs between groups (see Gatersleben, 2000; Gatersleben & Vlek, 1998;
 19 Inglehart, 1990; Poortinga et al., 2001). For example, Dutch respondents with greater
 20 environmental concern evaluate environmental quality and personal freedom as
 21 more important, and material wealth as less important than do respondents with less
 22 environmental concern. Dutch women value personal freedom and maturity more
 23 than do men, and unmarried persons evaluate family, health, and safety as less
 24 important than do couples and families (Poortinga et al., 2001). The relative
 25 importance of environmental values also depends on the resource context (Heath &
 26 Gifford, 2005). Obviously, current and future sustainable forms of transport may
 27 affect various groups in society differently, and group differences may exist in what is
 28 considered to be sustainable (or livable) transport (see also Adams, 1999, and
 29 Button, 1982). Consequently, the interests of various groups should be balanced, and
 30 it may be necessary to compensate groups that are disproportionately affected by
 31 current and future transport systems. Also, the relative importance of QoL indicators
 32 may vary over time (see Gatersleben, 2000; Inglehart, 1990). This implies that the
 33 multi-attributive evaluation of QoL effects of sustainable transport scenarios may be
 34 time-dependent. Which QoL aspects should be considered is known, but the relative
 35 importance of various QoL aspects, and consequently, overall (multi-attributive)
 36 QoL effects should be monitored regularly. This will also reveal to what extent actual
 37 QoL effects differ from anticipated effects. Based on these considerations, policies for
 38 developing sustainability may need to be adapted.

39

41

42 *11.3.3. Significance for Policy Making*

43

44 Policy-makers should take into account the extent to which their policies may affect
 45 judged QoL. Transport policies will be less acceptable, and consequently, less feasible

1 and less effective, if they have significant negative impacts on QoL. For example,
3 restrictions on freedom of choice may evoke serious resistance, psychological
5 reactance (Brehm, 1966). As a consequence, restrictive policy plans may have no
7 effect, or even opposite effects from what was intended (Tertoolen, Van Kreveld, &
9 Verstraten, 1998). If specific transport policies aimed at reducing car use are believed
11 to threaten freedom of choice, drivers might be motivated to continue driving,
13 regardless of the possible negative consequences.

15 Sustainable transport may imply different things in different regions and cultures,
17 and consequently, specific sustainable transport plans may be evaluated differently in
19 these regions and cultures. For example, North American society is more strongly
21 tuned towards the regular use of cars than many European societies, such as Dutch
23 society. Of course, inter-city distances in Canada and parts of the US are much
25 greater than those in the Netherlands. Also, the public transport system in the
27 Netherlands is sophisticated compared to that in many parts of North America.
29 Thus, car dependency (i.e., the level of car use, car-oriented land use, and quality of
31 travel alternatives; Newman & Kenworthy, 1999) is much higher in North America
33 compared to the Netherlands. This implies that reductions in car use may have more
35 significant consequences for the QoL of North Americans than for the Dutch.
37 Similar differences may emerge when comparing regions within a country. For
39 example, reductions in traffic volume may significantly enhance the QoL of people in
41 densely populated areas (e.g., fewer traffic jams, less noise, better urban QoL), but
43 may reduce the QoL of rural dwellers (e.g., some key locations and activities may be
45 much more difficult to access).

27 **11.4. Conclusions**

29 Although no common definition of sustainable transport exists, most observers
31 would agree that sustainable transport implies balancing current and future
33 economic, social, and environmental qualities. A valid set of sustainable transport
35 indicators has not yet been identified. However, current traffic and transport trends
37 are not sustainable in the long term. The negative environmental, social, and
39 economic externalities outweigh the social and economic values of transport.
41 Sustainable transport is mainly investigated by examining the sustainability of
43 current transport systems. In this case, the positive and negative values and
45 externalities of current transport systems are examined, such as energy and land use,
waste, traffic safety, traffic noise, health consequences, accident costs, accessibility,
and economic wealth. Governments and international bodies such as the OECD
often apply this approach. Sustainability indicators are defined and operationalised
as sustainable transport policy goals, and whether the transport system is moving
towards sustainability is monitored. In some cases future projections are also made.

In addition, the effects of various transport plans on sustainability are being
assessed. This implies a need to consider a broader range of sustainability indicators,
because changes in current transport systems may affect other sectors that also

1 contribute to unsustainable development (such as employment levels). Various
2 methods and models have been developed to assess economic, social, and
3 environmental consequences of transport plans. However, at present, only a few
4 social indicators are being considered, because of the lack of knowledge and valid
5 methods, tools, and techniques for assessing relevant social impacts.

6 Obviously, an important question concerns how the public evaluates such
7 sustainable futures, and whether transitions to sustainable transport systems are
8 acceptable to the public. These transitions may not be acceptable to everyone,
9 because sustainable transport may conflict with individual short-term interests,
10 especially if individual car users are asked to significantly adapt their lifestyles and
11 transport behaviour. We should therefore also examine to what extent transitions to
12 sustainable transport would affect individual QoL, and to what extent such
13 transitions are acceptable to the public.

14 This chapter proposes a compensatory methodology for assessing the QoL effects
15 of transitions to transportation systems that systematically differ in the extent to
16 which they are sustainable. QoL is a multidimensional construct and is defined as the
17 extent to which important values and needs are fulfilled. Subjective evaluations of
18 QoL, i.e., cognitive evaluations of citizens' lives as a whole, are considered. A list of
19 22 QoL indicators was introduced for assessing QoL effects of transport policy plans;
20 the list is believed to represent a wide range of dimensions that are important to
21 consumers (and thus travellers). The QoL effects of possible transportation scenarios
22 are assessed by asking respondents to indicate to what extent various transportation
23 scenarios would affect relevant QoL indicators, and how important each indicator is
24 to their lives. The overall expected changes in QoL may be calculated by summing
25 the expected changes on the QoL indicators, possibly after multiplying the
26 importance assigned to it. Several empirical studies revealed that the QoL concept
27 is useful for assessing actual as well as expected QoL effects of various sustainable
28 transport scenarios. They reveal not only whether overall QoL is or would be
29 affected by transport plans, but also how QoL would be affected, i.e., which QoL
30 indicators are expected to improve or deteriorate under different sustainable
31 transport scenarios. Moreover, the method enables examination of which groups'
32 QoL would be affected most strongly. Based on this, politicians and policy-makers
33 should be able to decide whether and how specific groups should be compensated,
34 and to better inform the public about expected positive and negative effects of the
35 proposed sustainable policies. This would greatly improve the current situation, in
36 which decisions often are based on the preferences of special-interest groups. At
37 present, significant minorities that wield sufficient political power can obstruct
38 particular solutions or compromises, which leaves governments with options that are
39 unacceptable for others and/or watered down so much that their effectiveness
40 becomes questionable.

41 The objective and subjective approaches described above are not contradictory;
42 they complement each other. Assessments of sustainable transport typically are
43 based on objective measures, whereas QoL assessments typically are based on
44 subjective evaluations. QoL effects must be considered when designing and
45 implementing sustainable transport plans, because they are crucial for the public

1 acceptability, and consequently the feasibility and effectiveness, of such plans.
2 Sustainable transport plans will be strongly opposed when citizens believe the plans
3 will significantly reduce their QoL. Sustainable development is unlikely to develop
4 when sustainable transport is believed to be associated with significant reductions in
5 individual QoL. To improve the chances for sustainable development, the basis of the
6 expectations that sustainable transport will reduce QoL must be investigated. If the
7 expectations are realistic, policy-makers should consider other ways to achieve
8 sustainable transport that would affect QoL less negatively, or even positively. The
9 extent to which possible negative effects could be compensated, e.g., by implementing
10 additional policies, should be examined. However, it may also be that such
11 expectations are based on lack of knowledge (e.g., people are not aware of
12 environmental problems caused by car traffic) or misperceptions. In this case, the
13 public should be informed and educated to the need for, and possible consequences
14 of, sustainable transport.

15 The methodology described in this chapter may be used to collect lay judgments
16 about which QoL changes would be anticipated if possible future scenarios were to
17 be enacted. Many psychological processes will influence these judgments. For
18 example, well-considered judgments about the expected QoL effects of transport
19 plans may not be obtained if respondents do not think enough about the advantages
20 and disadvantages of sustainable transport compared to a business-as-usual scenario.
21 This may be facilitated by providing citizens or study respondents with clear
22 descriptions or visualisations of plausible changes in transport, and by describing
23 what each one implies for them personally. Members of the public must be involved
24 in the development of sustainable transport scenarios. Changes understandably are
25 met with initial resistance, as long as individuals are unconvinced of the positive
26 consequences. Individuals generally judge their expected QoL in comparison to some
27 standard, e.g., the QoL of others, their current QoL, or their aspirations. These
28 standards are adapted in response to changes in their circumstances. This implies that
29 changes in transport may initially negatively influence QoL, but because individuals
30 usually adapt fairly quickly, no significant reductions in QoL may occur in the long
31 term. Thus, support for sustainable transport plans may be stronger after they have
32 been implemented. Finally, because the relative importance of QoL indicators may
33 vary over time, the expected and actual changes in QoL of sustainable transport
34 scenarios should be monitored continuously, and policies should be adapted when
35 necessary.

36 Although much important work has been done to understand sustainable
37 transport, many questions remain. The methods used for assessing sustainable
38 transport and for assessing QoL effects of sustainable transport scenarios need to be
39 further developed. For example, methods must be developed to examine how valid
40 judgments can best be collected, and how psychological processes that may affect
41 QoL evaluations can best be understood. Further, whether the results of studies like
42 the ones reported here may be generalised to transport behaviour in everyday life
43 need to be examined. As noted earlier, a multi-attribute model may be especially
44 appropriate when citizen involvement is high, but other models are necessary when
45 involvement is low, as it often is. The everyday preferences of many citizens might be

1 better predicted by fast-and-frugal or non-compensatory models. Finally, whether
 2 the present list of QoL indicators is comprehensive should be investigated. Relations
 3 between or among QoL indicators should be examined more thoroughly. For
 4 example, some QoL indicators refer to goals (e.g., comfort, status, or affection), but
 5 others refer to resources (e.g., money, time, or health) that may be used to fulfil these
 6 goals (see Ormel et al., 1997). This distinction perhaps should be made more clearly,
 7 to better understand how transport plans affect QoL.

8 The development of sustainable transport scenarios with QoL should be combined
 9 with assessments of those scenarios. Individuals may assess the QoL effects of
 10 transport plans that fulfil general sustainability criteria, but one may also assess the
 11 sustainability of transport plans that optimise the QoL of current as well as future
 12 generations.

13

15 **Uncited References**

17 Gifford (2002); Heath (2004); Max-Neef (1991); Steg & Sieversm (2000).

19

21 **References**

21

22 Adams, J. (1999). The social implications of hypermobility. In: *The economic and social
 23 implications of sustainable transportation* (OECD, Project on sustainable transport, EST).
Proceedings of the Ottawa workshop, 20–21 October. OECD publications, Paris.

24 Beatley, T. (1995). The many meanings of sustainability. *Journal of Planning Literature*, 9(4),
 25 339–342.

26 Berkhout, P. H. G., Muskens, J. C., & Velthuisen, J. W. (2000). Defining the rebound effect.
 27 *Energy Policy*, 28(6/7), 425–432.

28 Brehm, J. W. (1966). *A theory of psychological reactance*. New York: Academic Press.

29 Button, K. J. (1982). *Transport economics*. London: Heinemann.

30 Clark, W. (2000). *Traffic report: Weekday commuting patterns*. Canadian Social Trends
 31 (Statistics Canada Catalogue No. 11-008).

32 De Groot, J., & Steg, L. (2005). *Quality of life and sustainable transportation*. Manuscript **AU:3**
 33 submitted for publication.

34 Department for Transport. (2004). *The Future of Transport – White Paper CM 6234*.
 35 Department for Transport, London. Available on: [http://www.dft.gov.uk/stellent/groups/
 36 dft_about/documents/divisionhomepage/031259.hcsp](http://www.dft.gov.uk/stellent/groups/dft_about/documents/divisionhomepage/031259.hcsp)

37 Diener, E. (1995). A value based index for measuring national quality of life. *Social Indicators
 38 Research*, 36, 107–127.

39 Diener, E. (2000). Subjective well-being: The science of happiness and a proposal for a national
 40 index. *The American Psychologist*, 55(1), 34–43.

41 Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three
 42 decades of process. *Psychological Bulletin*, 125(2), 276–302.

43 Feather, N. T. (1995). Values, valences and choice: The influence of values on the perceived
 44 attractiveness and choice of alternatives. *Journal of Personality and Social Psychology*, 68(6),
 45 1135–1151.

- 1 Fiske, S. T., & Neuberg, S. L. (1990). A continuum of impression formation, from category-
 3 based to individuating processes: Influences of information and motivation on attention and
 5 interpretation. *Advances in Experimental Psychology*, 23, 1–74.
- 7 Frank, L. D., Andresen, M. A., & Schmidt, T. L. (2004). Obesity relationships with
 9 community design, physical activity, and time spent in cars. *American Journal of Preventive
 11 Medicine*, 27, 87–96.
- 13 Gardner, G. T., & Stern, P. C. (1996). *Environmental problems and human behavior*. Needham
 15 Heights: Allyn and Bacon.
- 17 Gatersleben, B., & Vlek, C. (1998). Household consumption, quality-of-life and environmental
 19 impacts: A psychological perspective and empirical study. In: K. J. Noorman & A. J.
 21 M. Schoot Uiterkamp (Eds), *Green households? Domestic consumers, environment and
 23 sustainability* (pp. 141–183). London: Earthscan.
- 25 Gatersleben, B. C. M. (2000). *Sustainable household metabolism and quality of life: Examining
 27 the perceived social sustainability of environmentally sustainable household consumption
 29 patterns*. Doctoral dissertation University of Groningen, Department of Psychological,
 31 Pedagogical and Sociological Sciences, Groningen, The Netherlands.
- 33 Geurs, K. T., & Van Wee, G. P. (2000). *Environmentally sustainable transport: Implementation
 35 and impacts for the Netherlands for 2030*. The Netherlands: RIVM, Bilthoven.
- 37 Gifford, R. (2002). *Environmental psychology: Principles and practice*. BC, Canada: Optimal
 39 Books, Victoria.
- 41 Gigerenzer, G., & Todd, P. M. (1999). *Simple heuristics that make us smart*. New York: Oxford.
- 43 Gilbert, R., & Tanguay, H. (2000). *Sustainable transportation performance indicators project.
 45 Brief review of some relevant worldwide activity and development of an initial long list of
 indicators*. The Centre for Sustainable Transportation, Toronto, ON, Canada.
- Greenwald, A., & Leavitt, C. (1984). Audience involvement in advertising: Four levels. *Journal
 of Consumer Research*, 11, 581–592.
- Gudmundsson, H. (2001). *Indicators and performance measures for transportation, environment
 and sustainability in North America* (Research Notes No. 148). Ministry of Environment and
 Energy, National Environmental Research Institute, Roskilde, Denmark (available at
http://www.dmu.dk/1_viden/2_publicationer/3_arrapporter/rapporter/AR148.pdf).
- Heath, Y. (2004). *Investigation of dynamic value hierarchy in environmental issues: The
 interaction between situational factors and individual value endorsement level*. Dissertation
 presented to the Department of Psychology, University of Victoria, Victoria, BC, Canada.
- Heath, Y., & Gifford, R. (2002). Extending the theory of planned behavior: Predicting the use
 of public transportation. *Journal of Applied Social Psychology*, 32, 2154–2189.
- Inglehart, R. (1990). *Culture shift in advanced industrial society*. Princeton, NJ: New Jersey
 University Press.
- Jakobsson, C. (2004). Accuracy of household planning of car use: Comparing prospective to
 actual car logs. *Transportation Research Part F*, 7, 31–42.
- Joireman, J. A., Van Lange, P. A. M., & Van Vugt, M. (2004). Who cares about the
 environmental impact of cars? Those with an eye toward the future. *Environment and
 Behavior*, 36, 187–206.
- Kahneman, D., & Tversky, A. (1984). Choices, values and frames. *The American Psychologist*,
 39, 341–350.
- Katzev, R. (2003). Car sharing: A new approach to urban transportation problems. *Analyses
 of Social Issues and Public Policy*, 3(1), 65–86.
- Litman, T. (2003). *Sustainable transportation indicators* (available at <http://www.vtpi.org>).
 Victoria, BC, Canada: Victoria Transport Policy Institute.

- 1 Maslow, A. H. (1954). *Motivation and personality*. New York: Harper & Row.
- 2 Max-Neef, M. A. (1991). *Human scale development: Conception, application and further*
 3 *reflections*. New York/London: The Apex Press.
- 4 Meyers, D. G. (1992). *The pursuit of happiness: Discovering pathways to fulfilment, well-being*
 5 *and enduring personal joy*. New York: Avon Books.
- 6 Newman, P., & Kenworthy, J. (1999). *Sustainability and cities: Overcoming automobile*
 7 *dependency*. Washington, DC: Island Press.
- 8 Nordlund, A. M., & Garvill, J. (2003). Effects of values, problem awareness, and personal
 9 norm on willingness to reduce personal car use. *Journal of Environmental Psychology*, 23,
 10 339–347.
- 11 OECD. (1976). *Measuring social well-being: A progress report on the development of social*
indicators. Paris: OECD Publications.
- 12 OECD. (1982). *The OECD list of social indicators*. Paris: OECD Publications.
- 13 OECD. (1996). *Towards sustainable transportation*. Paris: OECD Publications.
- 14 OECD. (2002). *OECD guidelines towards environmentally sustainable transport*. Paris: OCED
 15 Publications.
- 16 Ormel, J., Lindenberg, S., Steverink, N., & Vonkorff, M. (1997). Quality of life and social
 17 production functions: A framework for understanding health effects. *Social Science &*
Medicine, 45(7), 1051–1063.
- 18 Poortinga, W., Steg, L., & Vlek, C. (2004). Values, environmental concern and environmental
 19 behavior: A study into household energy use. *Environment and Behavior*, 36(1), 70–93.
- 20 Poortinga, W., Steg, L., Vlek, C., & Wiersma, G. (2003). Household preferences for energy-
 21 saving measures: A conjoint analysis. *Journal of Economic Psychology*, 24(1), 49–64.
- 22 Poortinga, W., Wiersma, G., Steg, L., Vlek, C., Noorman, K. J., Moll, H., & Schoot
 23 Uiterkamp, T. (2001). *Expected quality of life impacts of experimental scenarios for*
sustainable household energy use. Unpublished manuscript. Centre for Environmental and
 24 Traffic Psychology/Centre for Environmental Studies, University of Groningen, Groningen,
 25 The Netherlands.
- 26 Reser, J. (1980). Automobile addiction: Real or imagined? *Man-Environmental Systems*, 10, **AU:4**
 27 279–287.
- 28 RIVM: National Institute of Public Health and the Environment. (2000). *Nationale*
 29 *Milieuverkenning 5: 2000–2030 [National Environmental Investigation 2000–2030]*. Samsom
 30 H. D. Tjeenk Willink, Alphen aan den Rijn, The Netherlands (in Dutch).
- 31 Rokeach, M. (1973). *The nature of human values*. New York: The Free Press.
- 32 Ruckelhaus, W. D. (1989). Toward a sustainable world. *Scientific American*, September,
 33 pp. 114–120.
- 34 Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances
 35 and empirical tests in 20 countries. *Advances in Experimental Social Psychology*, 25, 1–65.
- 36 Schwartz, S. H., & Bilsky, W. (1987). Toward a universal psychological structure of human
 37 values. *Journal of Personality and Social Psychology*, 53(3), 550–562.
- 38 Schwartz, S. H., & Bilsky, W. (1990). Toward a theory of the universal content and structure
 39 of values: Extensions and cross-cultural replications. *Journal of Personality and Social*
Psychology, 58(5), 878–891.
- 40 Skolnik, M. (1997). *Duurzaam verder? Een onderzoek naar de betekenis van economie en milieu*
 41 *voor de kwaliteit van leven [Sustainable progress? A study on the meaning of economy and*
 42 *environment for quality of life]*. Master Thesis, University of Groningen, Department of
 43 Psychology, Groningen, The Netherlands (in Dutch).
- 44
- 45

- 1 Slotegraaf, G., & Vlek, C. (1996). *The perception of global warming and the acceptability of*
 3 *energy saving policies*. Unpublished manuscript. University of Groningen, Department of
 Psychology, Groningen, The Netherlands (in Dutch).
- 5 Steg, L. (2003a). Can public transport compete with the private car? *IATSS Research*, 27(2),
 27–35.
- 7 Steg, L. (2003b). Factors influencing the acceptability and effectiveness of transport pricing.
 In: B. Schlag & J. Schade (Eds), *Acceptability of transport pricing strategies* (pp. 187–202).
 Oxford: Elsevier Science.
- 9 Steg, L. (2003c). Motives and behaviour in social dilemmas relevant to the environment. In:
 L. Hendrickx, W. Jager & L. Steg (Eds), *Human decision making and environmental*
 11 *perception: Understanding and assisting human decision making in real-life settings*
 (pp. 83–102). Groningen, The Netherlands: University of Groningen, Department of
 Psychology.
- 13 Steg, L., & Kalfs, N. (2000). *Altijd weer die auto! Sociaal – en gedragswetenschappelijk*
 15 *onderzoek en het verkeers – en vervoerbeleid [Always the car! Behavioural science research and*
Traffic and Transport Policy]. Social and Cultural Planning Office of The Netherlands, Den
 Haag, The Netherlands (in Dutch).
- 17 Steg, L., & Sieversm, I. (2000). Cultural theory and individual perceptions of environmental
 risks. *Environment and Behavior*, 32(2), 248–267.
- 19 Steg, L., & Vlek, C. (1997). The role of problem awareness in willingness-to-change car use and
 in evaluating relevant policy measures. In: J. A. Rothengatter & E. Carbonell Vaya (Eds),
Traffic and transport psychology: Theory and application (pp. 465–475). Oxford: Pergamon.
- 21 Steg, L., Vlek, C., Lindenberg, S., Groot, T., Moll, H., Schoot Uiterkamp, T., & Van
 Witteloostuijn, A. (2003). *Towards a comprehensive model of Sustainable Corporate*
 23 *Performance. Second interim report of the Dutch SCP project*. University of Groningen,
 Department of Psychology, Groningen, The Netherlands.
- 25 Steg, L. W. Abrahamse, C., Vlek, G., Wiersma, K. J., Noorman, M., Oostra, P., Van Kampen,
 P., Smeets, S., Graas, H. G., & Roos, J. (2002). *Energiebesparing door gedragsverandering.*
 27 *De invloed van informatie, feedback en commitment op energiegebruik, psychologische*
achtergronden en kwaliteit van leven [Reducing energy use via behavioural change].
 University of Groningen, Department of Psychology, Groningen, The Netherlands (in
 29 Dutch).
- 31 Suh, E., Diener, E., & Fujita, F. (1996). Events and subjective well-being: Only recent events
 matter. *Journal of Personality and Social Psychology*, 70, 1091–1102.
- 33 Tertoolen, G., Van Kreveld, D., & Verstraten, E. C. H. (1998). Psychological resistance against
 attempts to reduce private car use. *Transportation Research Part A*, 32, 171–181.
- 35 Tretvik, T. (2003). Urban road pricing in Norway: Public acceptability and travel behaviour.
 In: B. Schlag & J. Schade (Eds), *Acceptability of transport pricing strategies* (pp. 77–92).
 Oxford: Elsevier Science.
- 37 V&W (1991). *Tweede Structuurschema Verkeer en Vervoer [Second Traffic and Transport*
Plan]. Ministerie van Verkeer en Watersstaat (Dutch MoT), 's Gravenhage, The
 39 Netherlands (in Dutch).
- Veenhoven, R. (2004). *World database of happiness, catalogue of happiness in nations*. Available
 41 at <http://www.eur.nl/fsw/research/happiness/>
- Vlek, C., Skolnik, M., & Gatersleben, B. (1998). Sustainable development and quality of life:
 43 Expected effects of prospective changes in economic and environmental conditions.
Zeitschrift für Experimentelle Psychologie, 45(4), 319–333.

1 Vlek, C. A. J., Rooijers, A. J., & Steg, E. M. (1999). *Duurzaam consumeren: meer kwaliteit van*
3 *leven met minder materiaal?* [Sustainable consumption: better quality of life with less
material?]. University of Groningen, Department of Psychology, Groningen, The Netherlands
(in Dutch).

5 WCED (World Commission on Environment and Development). (1987). *Our common future*.
Oxford: Oxford University Press.

7

9

11

13

15

17

19

21

23

25

27

29

31

33

35

37


39

41

43

45

AUTHOR QUERY FORM

	Book: BBST-V001 Chapter: 11	Please eail or fax your responses and any corrections to: Email: Fax:
---	--	--

Dear Author,

During the preparation of your manuscript for typesetting, some questions may have arisen. These are listed below. Please check your typeset proof carefully and mark any corrections in the margin of the proof or compile them as a separate list*.

Disk use

Sometimes we are unable to process the electronic file of your article and/or artwork. If this is the case, we have proceeded by:

- Scanning (parts of) your article Rekeying (parts of) your article
- Scanning the artwork

Bibliography

If discrepancies were noted between the literature list and the text references, the following may apply:

- The references listed below were noted in the text but appear to be missing from your literature list. Please complete the list or remove the references from the text.
- Uncited references*: This section comprises references that occur in the reference list but not in the body of the text. Please position each reference in the text or delete it. Any reference not dealt with will be retained in this section

Queries and/or remarks

Location in Article	Query / remark	Response
AU:1	Geurs & Van Wee (2003), Max-Neef (1992), Heath & Gifford (2005) and Gifford (2001) are not listed in the reference list. Please provide.	
AU:2	Please check the sentence 'Thus, the conviction of many ... and should at least be tested' for sense clarity.	
AU:3	In De Groot & Steg (2005), please provide the other details like publisher name and location.	
AU:4	In Reser (1980), please check the journal title expansion.	