

BEFORE THE MINNESOTA OFFICE OF ADMINISTRATIVE HEARINGS

600 North Robert Street
St. Paul, Minnesota 55101

FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION

121 Seventh Place East, Suite 350
St. Paul, Minnesota 55101-2147

In the Matter of the Further
Investigation into Environmental and
Socioeconomic Costs Under Minn.
Stat. § 216B.2422, Subd. 3

PUC Docket No. E-999/CI-14-643

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SURREBUTTAL TESTIMONY
of
TED GAYER, Ph.D.

ON BEHALF OF THE
MINNESOTA LARGE INDUSTRIAL GROUP

September 10, 2015

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I. INTRODUCTION

2 **Q. Please state your name.**

3 **A.** Ted Gayer.

4 **Q. Are you the same Ted Gayer who filed direct testimony in this case.**

5 **A.** Yes.

6 **Q. Have you reviewed the rebuttal testimonies of Dr. Polasky, Dr. Hanemann,**
7 **and Mr. Martin?**

8 **A.** Yes, I have.

9 **Q. What is the purpose of your Surrebuttal Testimony?**

10 **A.** The purpose of my surrebuttal testimony is to respond to these witnesses'
11 critiques of my direct testimony.

12

13

II. RESPONSE

14 **Q. Do you agree with Dr. Polasky's justification for Minnesota using a social**
15 **cost of carbon ("SCC") that considers the full benefits to the global**
16 **population?**

17

18 **A.** No, I very much disagree with his reasoning. He says, "I agree with Hanemann's
19 claim that '[a] molecule of emitted GHG contributes to damages from climate
20 change experienced everywhere around the globe, regardless of where it is
21 emitted' (Hanemann Direct, 12). This is the reason that I agree with the decision
22 by the IWG to consider the global impacts of emission of CO₂. Ignoring the

1 global damages from CO₂ emissions suggests we are not internalizing the full
2 external cost of our actions in Minnesota.” (Polasky, Rebuttal, 4.)
3

4 I agree with Dr. Hanemann (and Dr. Polasky) that CO₂ is a global emittant, but
5 that does not justify incorporating the benefits to the entire global population of
6 reducing CO₂ in a benefit-cost assessment for a state regulation. By advocating a
7 global approach irrespective of the actions of other jurisdictions, Dr. Polasky is
8 deviating from the approach economists, analysts, and policymakers typically use
9 in other contexts. Economists justify government interventions as a means of
10 improving social welfare, defined as the sum of the well-being of society. These
11 interventions can be to address shortfalls in societal well-being caused by market
12 failures, such as occurs when there are public goods or externalities. Or they can
13 be to address what one thinks are distributional inequities that are hindering
14 societal well-being. The goal largely agreed upon by all economists is to
15 maximize the net benefits to society, and Dr. Polasky is correct that—in the case
16 of externalities—this is achieved by internalizing the full external cost to society.
17 But whether we’re talking about addressing an externality, a public good, or
18 distributional inequities, the extent of the problem and the way to address it
19 depends on how one defines the “society” over which we are trying to maximize
20 net benefits. What Dr. Polasky is not saying is that economists typically define
21 “society” as the jurisdiction that is bearing the costs of the regulation or policy.
22
23

1 **Q. Please explain further.**

2 **A.** Take, for example, the case of redistribution in order to alleviate poverty. Such a
3 policy can be (and frequently is) justified by economists as improving societal
4 welfare since taking a dollar from a rich person is thought to diminish well-being
5 by less than the gain of giving a dollar to a poor person. Yet, if one doesn't
6 restrict consideration of the policy to the jurisdiction that is subject to the tax (that
7 is, if one takes Dr. Polasky's expansive view of defining "society"), then the
8 welfare improving policy would be to raise taxes on all Minnesotans (including
9 those who would be considered by Minnesota standards to be poor) and
10 redistribute the revenue to the poorest people of the world.

11

12 Dr. Polasky says that my reasoning here "conflates the justified responsibility of
13 Minnesotans to incorporate the damages that their actions cause to people
14 globally with the responsibility of local jurisdictions to care for their most
15 vulnerable citizens. I do not expect my neighbor to provide me meals, but if my
16 neighbor cuts down a tree and it falls on my house, I do expect him or her to pay
17 for it." (Polasky, Rebuttal, 28.) Dr. Polasky is presenting a very confusing
18 economic argument. His justification for the global approach for SCC is that it
19 addresses a market failure in the form of a pollution externality. There are also
20 economic reasons to alleviate poverty, but such policies invariably define society
21 as the jurisdiction bearing the costs of the policy. His example of not expecting
22 his neighbor to provide him meals is incorrect, because we *do* expect our neighbor
23 to provide meals for us when we are in need, which is why we have state and

1 federal anti-poverty programs, school lunch programs, food stamps, etc. For each
2 of these programs, the beneficiaries are residents of the jurisdiction enacting the
3 program, not the global population. And his example of his neighbor's tree
4 falling on his house is a poor one as well. The correct analogy is Dr. Polasky's
5 neighbor's tree falling on Dr. Polasky's house while Dr. Polasky's tree falls on his
6 neighbor's house. No one would expect Dr. Polasky to pay for the damage to his
7 neighbor's house if the neighbor does not also pay for the damage to Dr.
8 Polasky's house. Accordingly, addressing the damage *is and should be*
9 conditioned on reciprocity.

10

11 There are countless other examples: public-education decisions are not made with
12 consideration of the educational needs of the world, nor does optimal national-
13 defense spending consider extending full protection to everyone worldwide, nor
14 have previous national or state environmental regulations (*e.g.*, sulfur dioxide,
15 mercury) considered full benefits to people across borders.

16

17 Redistributive tax policy, education, and defense can and frequently do consider
18 the effects of people outside of the jurisdiction bearing the costs, but only insofar
19 as these things effect the residents of the jurisdiction through altruistic benefits
20 (*e.g.*, foreign aid) or through increased expectations of reciprocity (*e.g.*, defense
21 treaties).

22

23

1 Even other pollution regulations take account of reciprocity rather than providing
2 full benefits to other countries. To reiterate the example I provided in my direct
3 report as well, (*see* Gayer direct at 10), in situations in which U.S. pollution
4 endangers the public health or welfare of another country, the Clean Air Act
5 requires the Administrator of the U.S. Environmental Protection Agency to
6 formally notify the governor of the state in which the emissions originate, but
7 even this very limited accommodation “shall apply only to a foreign country
8 which the Administrator determines has given the United States essentially the
9 same rights with respect to prevention or control of air pollution occurring in that
10 country as is given that country by this section.” 42 U.S.C. § 7415(a & c); 42
11 U.S.C. § 7602(a) (definitions).

12
13 Dr. Polasky is asking Minnesota to give the preferences of everyone in the world
14 equal weight to those of Minnesotans who will fully bear the cost of the
15 regulations. This is not justified based solely on the fact that CO₂ is a global
16 emittant.

17
18 **Q. Do you agree with Dr. Hanemann’s statement that “The geographical scale**
19 **on which to consider impacts is a policy decision. While it has economic**
20 **implications, economic theory per se cannot prescribe what spatial scope**
21 **should be employed when considering the impacts of climate change.”?**
22 **(Hanemann, Rebuttal, 15.)**

23

1 A. No, I do not agree with Dr. Hanemann. While I agree that there is no theoretical
2 proof that determines how to define “society,” very important economic
3 consequences result from the decision, and, as described above, the typical and
4 appropriate approach is to define the geographic scope of the benefits of a
5 regulation to match the jurisdiction bearing the cost of the regulation, accounting
6 for explicit expectations of reciprocity from outside jurisdictions and accounting
7 for the benefits that residents within the jurisdiction accrue from feelings of
8 altruism. To suggest that the spatial scope of the affected society is a wide-open
9 policy decision is therefore erroneous.

10

11 **Q. Does Dr. Polasky offer any other justifications for considering global benefits**
12 **of CO₂ reduction from Minnesota’s regulation?**

13

14 A. Yes, he states that, “If every state, province, or other political territory only
15 considered the damages of their own CO₂ emissions within their own political
16 boundaries then there would be virtually no correcting for externalities. By
17 incorporating the full external cost of CO₂ emissions into resource planning
18 decisions in Minnesota, we as a state are both leading and preparing for a future
19 where the price of emitting carbon is no longer free.” (Polasky, Rebuttal, 26.)

20

21 **Q. Do you agree with this justification for considering the full benefits to the**
22 **world population for regulations in which the costs are borne solely by**
23 **Minnesotans?**

1 A. Dr. Polasky is suggesting that Minnesota should consider the full benefits to the
2 world in order to “lead” other states and countries to do the same. I think the
3 leadership goal supports my position that Minnesota should consider benefits to
4 non-Minnesotans only to the extent that there is an expectation of reciprocity (*i.e.*,
5 only if there is an expectation they others will follow Minnesota’s lead) and that
6 this goal undermines Dr. Polasky’s statements. Dr. Polasky seems to be saying
7 that if Minnesota considers global benefits in order to price CO₂, then other states
8 and countries will do the same. But he contradicts himself at other points in his
9 rebuttal when he argues against Dr. Smith’s and Dr. Mendelsohn’s position that
10 the IWG should use emission projections assuming an optimal level of future CO₂
11 emissions. He says, “An optimal emission projection assumes that there is a
12 global climate policy in place that equates the marginal cost of reducing emission
13 with the SCC and determines the quantity of emissions that would result from this
14 policy. As is clear to any observer of climate change policy, we do not have such
15 policy in place now, nor is there any guarantee that we will have such policy in
16 the future.” (Polasky, Rebuttal, 11.) Later on he says, “Getting to an optimal path
17 would require coordinated global policy, such as a uniform carbon tax across
18 countries or an international trading regime in carbon permits. To assume that
19 these will be in place any time soon and that we will be on an optimal path seems
20 highly unrealistic.” (Polasky, Rebuttal, 46.)

21

22 In other words, Dr. Polasky is arguing (against Dr. Smith’s and Dr. Mendelsohn’s
23 position of the appropriate baseline emissions to assume) that the IWG is correct

1 to assume no changes in baseline emission forecasts, and that Minnesota’s actions
2 won’t have any impact on what other states and countries do for their climate
3 regulations. He explicitly says that, “optimal emission reductions as a result of
4 this [Minnesota] policy...will not be the case, considering the scope of the
5 proposed Minnesota policy,” (Polasky, Rebuttal, 47), and he answers “No” to the
6 question “As a result of Minnesota adopting a higher value for the SCC will all
7 countries in the world reduce their emissions to the optimal level?” (Polasky,
8 Rebuttal 47-48.) Yet he also argues that Minnesota should price CO₂ considering
9 the full global costs to “lead” other states and countries to do the same.

10

11 You can’t have it both ways: one can’t argue that Minnesota should consider
12 benefits to the entire world population in order to “lead” others to do the same and
13 then also argue that doing so won’t lead others to do the same and will have no
14 effect on global emissions. Yet Drs. Polasky and Hanemann do exactly that, and
15 recommend that the Commission increase local costs without any meaningful
16 increase in Minnesota benefits. Thus, my position is that Minnesota should
17 consider benefits to non-Minnesotans only insofar as it expects reciprocity. That
18 is, Dr. Polasky’s leadership justification is only valid if there is an expectation
19 that others will follow. I agree with Dr. Polasky when he says that Minnesota
20 adopting a higher value for the SCC at this time will not lead others to reduce
21 their emission levels, which is why the global scope of the SCC is at this time
22 inappropriate for Minnesota to use for considering a state regulation. The
23 Commission is, of course, not permanently tied to its decisions in this proceeding.

1 Later developments, including developments relating to reciprocity (in the form
2 of international treaties or the implementation of the Clean Power Plan within the
3 U.S.) could justify subsequent changes relating to the CO₂ emissions inputs in any
4 damages model. The Commission can, at that time and if appropriate, re-evaluate
5 those model inputs, including the scope of the “society” that receives the benefits.
6

7 **Q. Do you agree with Dr. Polasky’s view that “leakages are not a concern**
8 **regarding the calculation of the marginal damages of a ton of emissions;**
9 **rather, leakages regard whether there will be emission increases outside of**
10 **Minnesota as a result of emission reductions in Minnesota. Therefore, the**
11 **issue of leakage does not affect the externality value the Commission would**
12 **adopt”?** (Polasky, Rebuttal, 29.)

13
14 **A.** I think Dr. Polasky’s statement is misleading. I agree with Dr. Polasky that there
15 is some true (though difficult to estimate) SCC, and that this SCC value is not
16 affected by leakage. I also agree with Dr. Polasky that applying this true SCC to
17 the regulations of all countries would lead to the efficient reduction in emissions.
18 However, Minnesota must take seriously the problem of leakage, especially if it
19 follows Dr. Polasky’s advice to price CO₂ much higher than neighboring states do
20 (since Dr. Polasky admits it is doubtful the other states will follow Minnesota’s
21 lead). If the SCC is applied inconsistently across states, then this would create a
22 distortion that would lead to an increase in emissions outside of Minnesota, thus
23 undermining the very purpose of Minnesota’s regulation. Conceptually, leakage

1 could even mean Minnesota's adoption of a high SCC estimate leads to more
2 harm to the environment than would occur if Minnesota does not adopt any
3 changes to its current regulation.

4

5 Leakage must thus be considered in the regulatory-decision process. The way to
6 do so is not by adjusting the SCC value estimate, but instead to apply the SCC to
7 the *net* reduction in emissions, as Dr. Smith suggests. So if the regulation is
8 expected to reduce emissions by 100 tons in Minnesota, but leakage will result in
9 an increase in 80 tons in other states, then the SCC should be applied to only 20
10 tons (meaning much lower benefits of the regulation). If Minnesota's adoption of
11 a high SCC leads to no reduction in global emissions, then Dr. Polasky would no
12 doubt agree that Minnesota should not adopt such a SCC. After all, the goal is to
13 reduce emissions, not to price emissions for the sake of pricing. It makes no
14 sense for Minnesota to consider the costs of its action on others, but to ignore how
15 Minnesota's actions could lead other states to harm Minnesotans (and the world).
16 Ignoring leakage would be equivalent to regulating a firm that is polluting a river
17 downstream even if one knows that this would lead the firm to relocate and
18 pollute upstream, thus failing to achieve the regulation's objectives (reducing
19 emissions) and potentially increasing exposure to more citizens.

20

21 **Q. Do you agree with Dr. Hanemann's view that leakage should not be**
22 **considered when applying a SCC value because, "PUC regulates only utilities**
23 **in Minnesota. It does not regulate utilities in other states or other countries.**

1 **The level of GHG emissions in other states is not the responsibility of PUC”?**

2 **(Hanemann, Rebuttal, 30.)**

3

4 **A.** No. As stated above, I concur with Dr. Smith’s testimony that leakage does not
5 change the value of the SCC, but it decidedly *does* need to factor into the
6 Commission’s decision-making. I very much disagree with Dr. Hanemann’s
7 suggestion that leakage should be ignored by the Commission because emissions
8 in other states are not Minnesota’s responsibility. The goal of Minnesota’s
9 regulation is to reduce GHGs. If Minnesota ignores emissions leakage, and if
10 regulating Minnesota’s utilities leads to a full offsetting increase in emissions in
11 other states, then it would make no sense for Minnesota to pursue the regulation.
12 Such a regulation that ignores leakage would result in economic costs and no
13 environmental benefits, and conceivably even an increase in emissions. This
14 relates to my position on the problem with counting the benefits to the global
15 population. Dr. Hanemann is suggesting that Minnesota should consider the costs
16 of its emissions to the entire global population, but it should ignore the
17 environmental costs that its regulatory actions will cause to Minnesotans (and the
18 rest of the world) due to leakages. If the reason to use a global SCC estimate is to
19 internalize the external cost, then one must also consider how applying the SCC
20 differentially across states will undermine this effort to internalize external costs
21 by shifting pollution to low-SCC states.

22

23

1 **Q. Do you agree with Dr. Polasky that, “While we cannot know damages from**
2 **CO₂ emissions with absolute certainty, assuming that damages are zero**
3 **simply because they are uncertain is surely the wrong answer and surely**
4 **would be an illegitimate and unscientific approach”?** (Polasky, Rebuttal 7.)

5

6 **A.** I do not agree with Dr. Polasky. Although I agree that uncertainty in and of itself
7 does not justify inaction, I emphasize that the uncertainty of any prediction
8 approaches infinity as time increases indefinitely. This is why we don’t use
9 economic models that forecast the distant future.

10

11 **Q. Do you agree with Dr. Polasky’s point that, “To see why simply ignoring**
12 **future uncertainty is the wrong approach, consider how the Congressional**
13 **Budget Office (“CBO”) makes projections regarding the future impact on**
14 **the federal deficit and debt when determining the budget implications of a**
15 **proposed bill. These projections often prove to be wrong, but they are based**
16 **on the best available evidence at the time and include an appropriate time**
17 **horizon”?** (Polasky, Rebuttal, 16.)

18

19 **A.** No. In fact, time horizons used by the CBO provide further support for my
20 position. Dr. Polasky leaves unanswered what is the “appropriate time horizon”
21 for the CBO to use and he seems unaware that the CBO must weigh the
22 uncertainty of its economic projections in the choice of this horizon. There
23 indeed is a debate on appropriate time horizons for evaluating various policies.

1 As my Brookings colleague Dr. Henry J. Aaron has written, “Because error and
2 uncertainty grow as the projection horizon is lengthened, in some cases,
3 lengthening the window is not useful and can degrade decision making.”¹ He has
4 opined that it is a “welcome change” that the CBO has recently shifted attention
5 towards the first 25 years in its 75-year projections. Dr. Aaron has further written
6 that the 75-year Social Security projections are useful because the variables that
7 the projections are based on can be reliably predicted, but should not be extended
8 further; and that Medicare projections should be pared down from 75 to 25 years.²
9 His overall point, which I share, is not that we should ignore all projections, but
10 that there is a point at which the uncertainty gets so large as to make the forecast
11 useless and not worth basing current policy on.

12
13 **Q. What example does Dr. Polasky use to justify the superiority of using the**
14 **mean versus the median for purposes of estimating damage calculations?**

15
16 **A.** Dr. Polasky uses the example of how we price home insurance. He says SCC
17 and home insurance, “both involve uncertainty about what damages might occur

¹ Henry J. Aaron, Ph.D., THE ECONOMICS AND POLITICS OF LONG-TERM BUDGET PROJECTIONS, Hutchins Center on Fiscal & Monetary Policy at Brookings, Working Paper #8, at 1 (Dec. 15, 2014).

² *Id.* at 14-16. Dr. Aaron aptly notes that “the simple fact is that no one alive today has much of an inkling about what sorts of medical advances will occur 75 years hence, a point in time as remote from today’s world as was the medical world of pre-World War II America. The nature of health care technology several decades in the future is unknowable, just as physicians of 1940 were unaware of organ transplantation, *in vitro* fertilization, non-invasive diagnostic radiology, angioplasty, coronary bypass grafts, and most drugs now in common use.” *Id.* at 16.

1 in the future. If we could be certain there would be no damages to our house over
2 the next year, the value of home insurance would be zero. But the value of
3 insurance is greater than zero because there is some, perhaps small, probability
4 that a damage-causing event will happen (e.g., severe storm, fire). Suppose that
5 there is a 5 percent chance of such an event occurring. That means there is a 95
6 percent chance that no such event will occur. In other words, 95 times out of 100,
7 the possible future cost of damage to our home is \$0.00. Five times out of 100,
8 however, the cost of those damages could be quite large. If we calculate the
9 median of expected damages over the coming year, it is zero.” (Polasky,
10 Rebuttal, 38.)

11

12 **Q. Do you agree with Dr. Polasky’s illustrative example?**

13

14 **A.** No. Although I agree with the use of mean risk in expected value calculations,
15 Dr. Polasky confuses uncertainty with risk. He states that the issue of SCC and
16 pricing home insurance “both involve uncertainty,” but his example is about risk,
17 not uncertainty. His insurance example envisions a scenario where there is a 5
18 percent *risk* of damage. Risk is the probability of an event occurring; uncertainty
19 is the degree of imprecision in the estimate of risk. For example, consider two
20 new automobiles. One poses a well-known defect risk of 2 in 1,000 over the
21 lifetime of the vehicle. The other is newer to the market, and there is a 50-50
22 chance that the defect risk is either 1 in 1,000 or 3 in 1,000. Both of these
23 automobiles have the same average risk (2 in 1,000), but the latter has greater

1 uncertainty about the risk.

2

3 **Q. Why does Dr. Polasky’s conflation of risk and uncertainty matter?**

4

5 **A.** The problem with confusing risk and uncertainty becomes apparent later in his
6 rebuttal, when Dr. Polasky says “it would also be reasonable for the Commission
7 to adopt the full range of SCC values, across all three discount rates *as well as the*
8 *95th percentile value.*” (Polasky, Rebuttal, 35.) His home-insurance example
9 suggests pricing risk and would likewise suggest that, where there is uncertainty
10 about the degree of risk, one should use the mean level of risk, not the 95th
11 percentile value, which would lead to over-insurance.

12

13 Dr. Polasky seems to be suffering from a form of the psychological finding
14 known as the Ellsberg Paradox.³ Consider the two hypothetical automobiles I
15 discussed in the previous answer. Dr. Polasky’s insurance example, which is the
16 right approach, would suggest that these vehicles should be equally insured
17 against defect risk, since they both have the same average risk (2 in 1,000).
18 However, the Ellsberg Paradox has demonstrated that people mistakenly exhibit a
19 form of ambiguity aversion that makes the precisely known risk of the first
20 automobile less fearsome than the uncertain risk of the second automobile.

³ The Ellsberg Paradox is a paradox in decision theory in which people’s choices violate the postulates of subjective expected utility in that they demonstrate a preference for taking on risk in which they know the specific odds rather than an alternative risk in which the odds are completely ambiguous. It is generally taken to be evidence for ambiguity aversion.

1 Ambiguity aversion is a form of irrational behavior and should not be confused
2 with risk aversion in which people are averse to the risk of incurring a large loss.
3 People might quite rationally choose to purchase a homeowners insurance policy
4 for \$1,000 even though the expected losses are only \$800, but losses could be
5 significant. A very low probability of a catastrophic loss would make such
6 insurance attractive to a risk-averse person and could be quite rational. What
7 would not be rational is to be swayed by the uncertainty regarding the risk
8 probability.

9
10 This is why it is a mistake to use the 95th percentile value of a risk estimate (as Dr.
11 Polasky is suggesting). Doing so over-weights uncertain risks relative to more
12 certain risks, and this distorts our policies and regulations in harmful ways. Take
13 another hypothetical example where we have enough money to clean up one
14 hazardous waste site and we are deciding between two sites. Site A contains a
15 chemical contaminate that is well studied by researchers and presents a cancer
16 risk of 1.25 in a million, known with certainty. Site B presents a relatively less
17 researched contaminant that has an estimated cancer risk of 1 in a million, but
18 there's a 50 percent chance of no risk and a 50 percent chance of a risk of 2 in a
19 million. Site A presents a higher average risk (25 percent higher than the risk at
20 Site B), so we should devote our resources to cleaning it up before Site B, since
21 doing so will prevent more cancer cases. But if one puts undue weight on
22 uncertainty, as Dr. Polasky does, then the resources will be devoted to cleaning up
23 the more uncertain Site B, which decision, on average, would result in *more*

1 expected cancer cases because of the higher average risk of cancer by not
2 cleaning up Site A.

3

4 **Q. What example does Dr. Hanemann use to justify the use of the 95th percentile**
5 **of the SCC distribution?**

6

7 **A.** Dr. Hanemann uses an example similar to Dr. Polasky's example, this one offered
8 by Mr. Nick Robins. "We wouldn't get on a plane if there was a 5% chance of
9 the plane crashing, but we're treating the climate with that same level of risk in a
10 very offhand, complacent way." (Hanemann, Rebuttal, 71.)

11

12 **Q. Do you agree with this example?**

13

14 **A.** No. Although I agree that we should not ignore climate risks, Dr. Hanemann (like
15 Dr. Polasky) is confusing risk with uncertainty in an attempt to justify the use of
16 the 95th percentile of the distribution of the SCC. The correct analogy is to
17 suppose that Plane 1 has a 5 percent chance of crashing and we know with
18 certainty that the risk is 5 percent (*i.e.*, it will definitely crash 5 in 100 times).
19 Suppose Plane 2 has an average risk of crashing of 4 percent, but there's a 50
20 percent chance that its risk of crashing is really 0 percent and a 50 percent chance
21 that its risk of crashing is really 8 percent. Plane 2 has a lower average risk, so
22 the rational choice is to choose to fly on Plane 2 rather than Plane 1. Of course,
23 the Ellsberg Paradox suggests that numerous people (including apparently Dr.

1 Polasky and Dr. Hanemann) would choose to fly on Plane 1, not understanding
2 the higher risk they are taking. By including the 95th percentile of the SCC
3 distribution (and not including the 5th percentile), Dr. Hanemann is in effect
4 putting more weight on regulating uncertain, lower average, risk over more
5 certain, higher average, risk. A classic Ellsberg-Paradox analytical mistake.

6

7 **Q. Do you disagree with any of Dr. Polasky’s justifications for using a 2.5%**
8 **discount rate?**

9

10 **A.** I take issue with his justification that “Given that many economists forecast
11 slower future growth rates than we experienced in the recent past (see for example
12 Robert Gordon...), it is quite plausible to argue for low discount rates and quite
13 implausible to argue for higher rates.” (Polasky, Rebuttal, 24.) This is cherry-
14 picking a paper to justify a position. Many economists disagree with Dr.
15 Gordon’s pessimistic forecast, including the CBO,⁴ which Polasky previously
16 praises for using the “best available evidence.” (Polasky, Rebuttal, 16.) But even
17 more problematic is that Dr. Polasky wants to rely on Gordon’s forecast of low
18 growth to justify a low discount rate, yet he doesn’t take issue with the IWG’s

⁴ See <https://www.cbo.gov/publication/45448> (“CBO projects that, after 2017, real GDP will grow at the same rate as potential GDP—by an average of about 2¼ percent per year during the 2018–2024 period—because the agency does not attempt to predict the timing or magnitude of business cycle fluctuations in the economy so far into the future. With the population expected to grow by about 1 percent per year, real GDP per capita is projected to grow, on average, by about 1¼ percent per year between 2018 and 2024”). Dr. Gordon predicts, on the other hand, that the growth will be “half or less of the 1.9 percent annual rate experienced between 1860 and 2007.” See <http://www.nber.org/papers/w18315.pdf>.

1 models using higher projected growth rates to predict higher emissions. You
2 cannot rationally simultaneously argue for a climate regulation to address
3 predicted high emission levels that are based on an expectation of 2% per capita
4 GDP growth while also arguing that the regulatory decision should consider a
5 lower discount rate based on an expectation of 1% per capita GDP growth.

6

7 **Q. Has Mr. Martin correctly summarized your view on the appropriateness of**
8 **the IWG's SCC estimates?**

9

10 **A.** No. My testimony focused on the inappropriateness of the IWG using a global
11 cost of carbon when considering federal regulations, and by extension the even
12 more farfetched approach of using a global cost of carbon when considering a
13 regulation in which the costs are borne by Minnesotans.

14

15 Mr. Martin accurately summarizes my criticism of using the global scope for
16 evaluating Minnesota's regulation, but Mr. Martin mistakenly assumes that I
17 endorsed the full methodology the IWG used in arriving at their estimates for the
18 SCC, except for their use of the global geographic scope. He incorrectly assumes
19 that I endorsed the IWG's use of the 95th percentile value of the probability
20 distribution, the use of a 2.5 percent discount rate, and all the other modelling and
21 assumption choices of the IWG. In Table 3, he applies geographic adjustments
22 (which I recommend) to *all* of the IWG's SCC estimates, even though I did not
23 endorse the discount rates and the use of the 95th percentile of the confidence

1 interval. I deliberately did not opine upon, let alone endorse, such choices. The
2 point of my testimony is that the IWG erred in using a global approach to set the
3 federal SCC, and that a global approach is even more inappropriate for Minnesota
4 to use.

5

6 **Q. What is your response to Mr. Martin's comment that "Dr. Gayer does not**
7 **specify his source for this percentage [the 0.4 percent share of Minnesota**
8 **GDP to global GDP]"? (Martin, Rebuttal, 30, footnote 17.)**

9

10 **A.** Minnesota's GDP estimate comes from the U.S. Bureau of Economic Analysis.
11 For 2013, the nominal value is estimated at \$284.242 billion. The global GDP
12 estimate comes from the CIA's Factbook. For 2013, the nominal value is
13 estimated at \$74.31 trillion. The ratio of the two is 0.3825 percent.

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15 **Q. Does this conclude your surrebuttal testimony?**

16 **A.** Yes.

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