

Energy Supply Technical Work Group

Summary List of Pending Priority Policy Options for Analysis

	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2025 (Million \$)	Cost-Effective-ness (\$/tCO ₂ e)	Level of Support
		2015	2025	Total (2008–2025)			
ES-12	Distributed Renewable Energy Incentives and/or Barrier Removal	0.021	0.023	0.37	29.1	78.1	pending

Notes:

1. All option totals are relative to the underlying assumption that electric expansion in MN proceeds with the recently legislated Conservation Improvement Program, Renewable Energy Standard and all planned additions including the Mesaba and Big Stone 2 stations.

ES-12. Distributed Renewable Energy Incentives and/or Barrier Removal

Policy Description

Distributed renewable energy should be encouraged as it plays a part in the overall goal of reducing carbon emissions. This policy includes subsidies or incentives that encourage investment in small-scale distributed renewable energy resources.

Policy Design

Goals: The goal of this policy is to encourage investment small-scale distributed renewable energy via incentives and/or the prevention of barriers. Incentives for distributed renewables should include: (1) direct subsidies for purchasing/selling renewable technologies; (2) tax credits or exemptions for purchasing/selling renewable technologies; (3) feed-in tariffs, which provide direct payments to renewable generators for each kWh of electricity generated from a qualifying renewable facility (feed-in tariffs should take into consideration and recognize all the attributes of energy including carbon impact to the purchaser and the “green impact”); (4) tax credits for each kWh generated from a qualifying renewable facility; (5) allowing the distributed generation projects count toward the Conservation Improvement Program (CIP) savings goal of 1.5% annually if the investment is reasonable and prudent, whether utility-owned or customer-owned.

Timing: Analysis and review of technologies, financial incentives and size of a project to begin immediately

Parties Involved: All utilities serving customers in Minnesota; state agencies with jurisdiction; other interested stakeholders.

Other: A source to cover any financial incentive would need to be determined. The level of credit or funding should be consistent for all utilities (IOUs, municipals and cooperatives). The cost of the incentive should be shared among all end users so that no one is overly burdened.

Implementation Mechanisms

- Funding mechanisms and incentives
- Regulatory policies that support utility investments in small-scale distributed renewable energy.

Related Policies/Programs in Place

Renewable Energy Standard 25 × 25. Existing matching programs for investment in photovoltaic systems. Wind production tax credits.

Type(s) of GHG Reductions

Reductions in emissions of carbon dioxide from combustion sources.

Estimated GHG Reductions and Net Costs or Cost Savings

Data Sources:

- Annual Estimates of Housing Units for the United States and States: April 1, 2000 to July 1, 2005, available at U.S. Census Bureau annual data, released at the end of every July: <http://www.census.gov/popest/housing/HU-EST2005.html>
- New Privately Owned Housing Units, Authorized Unadjusted Units for Regions, Divisions, and States, U.S Census Bureau annual data, released end of every July, available at <http://www.census.gov/const/C40/Table2/t2yu200512.txt>
- 2001 EIA Residential Energy Consumption Survey, available at <http://www.eia.doe.gov/emeu/recs/recs2001/detailcetbls.html#space>
- Ratios of new residential/commercial floor space to total floor space, from EIA, available at <http://www.eia.doe.gov/emeu/cbecs/excel/b1.xls>
- Cooling degree-days in Minnesota, available from <http://lwf.ncdc.noaa.gov/oa/documentlibrary/hcs/cdd.200501-200607.pdf>
- Heating degree-days in Minnesota, available from Department of Commerce (<http://lwf.ncdc.noaa.gov/oa/documentlibrary/hcs/hdd.200507-200607.pdf>)
- Minnesota population projection, Minnesota State Demographic Center, available from <http://www.demography.state.mn.us/documents/MinnesotaPopulationProjections20052035.pdf>
- Utility electricity sales in 2005, available from U.S Energy Information Administration at <http://www.eia.doe.gov/cneaf/electricity/page/eia826.html>
- Sectoral electricity consumption, from EIA, available from U.S. Energy Information Administration at http://www.eia.doe.gov/cneaf/electricity/epa/epa_sprdshts.html (file sales_revenue.xls)
- The Energy Efficiency Task Force Report to the Clean and Diversified Energy Advisory Committee of the Western Governors' Association: The Potential for More Efficient Electricity Use in the Western United States, January, 2006, <http://www.westgov.org/wga/initiatives/cdeac/Energy%20Efficiency-full.pdf>

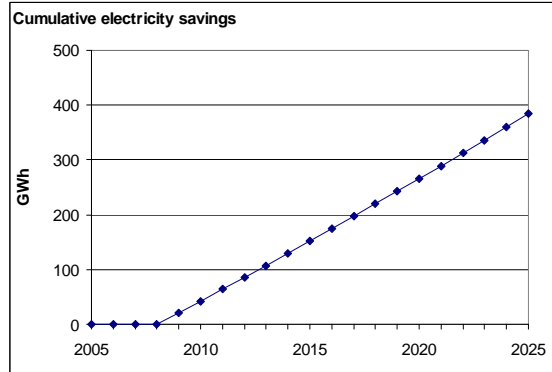
Quantification Methods:

This option encourage investment small-scale distributed renewable energy via incentives and/or the prevention of barriers. It has been modeled as a penetration of solar photovoltaic technology in new residential housing and commercial establishments.

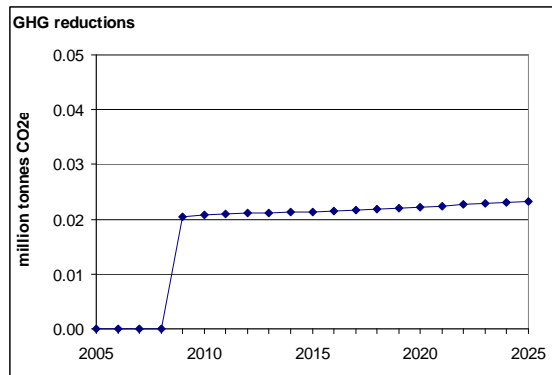
The ES TWG has made the following key assumptions for the analysis of this option, as follows:

- The start-up year for the option is 2009
- The penetration of residential distributed renewable systems in new homes and new commercial establishment is 5%.

Regarding generation, the chart below summarizes the cumulative savings associated with the penetration of distributed renewable energy in new residential and commercial units.



Regarding annual CO₂-equivalent (CO₂e) emission reductions, the impact of the option is summarized in the chart below. The annual emission reductions in 2015 and 2025 are 0.021 and 0.023 million tonnes CO₂e, respectively. The cumulative emission reductions over the 2009-2025 forecast period are 0.37 million tonnes CO₂e.



Regarding costs, there are cost savings associated with avoided fuel and O&M at existing power stations in MN. There are incremental costs associated with new solar photovoltaic technology. The annual product of real levelized costs and displaced generation is an estimate of the annual cost savings. The net present value of these annual costs are \$0.029 billion over the 2009-2025 period (2005\$).

Regarding the cost effectiveness of the option, it was calculated as the quotient of the NPV and cumulative GHG emission reductions, \$78.1/tCO₂e (2005\$) (i.e., \$0.029 billion divided by 0.37 million tonnes and multiplied by a conversion factor of 1,000).

Key Assumptions: See Annex 2

Key Uncertainties

TBD—[as needed and approved by the TWGs]

Additional Benefits and Costs

Reduction in electric transmission and distribution system; reduced air pollution

Feasibility Issues

Structuring of the incentive

Status of Group Approval

Pending—[until MCCAG moves to final agreement at meeting #8]

Level of Group Support

TBD—[blank until MCCAG meeting #8]

Barriers to Consensus

TBD—[blank until final vote by the MCCAG]

Annex 2:

ES-12: Renewable Distributed Renewable Generation

Assumed start year for option

2009

Distributed renewable resource

Solar photovoltaics

Assumption for penetration of residential distributed renewable systems in new homes

1

1	Penetration of PVs	5%	(default)
2	User-defined		

Assumption for penetration of commercial distributed renewable systems in new buildings

1

1	Penetration of PVs	5%	(default)
2	User-defined		

Marginal resource associated with electricity savings

1

1	coal & natural gas, prorata (default)
2	100% coal
3	system average

Real discount rate

1

1	Use	5%
2	User-defined	

Levelized costs for distributed renewables (2005\$/MWh)

196	Capacity
0	Balance of system
0	Installation
6	Variable O&M
201	Total

Assumed capital cost decrease over time?

2

1	Yes
2	No (default)

Avoided costs for electric supply (2005\$/MWh)

51	Capacity
4	Transmission
4	Fixed O&M
17	Variable O&M
111	Fuel
186	Total

Source: U.S Census Bureau annual data, released end of every July: <http://www.census.gov/popest/housing/HU-EST2005.html>

Geographic Area	Housing unit estimates						April 1, 2000	
	July 1, 2005	July 1, 2004	July 1, 2003	July 1, 2002	July 1, 2001	July 1, 2000	Estimates base	Census
United States	124,521,886	122,676,668	120,969,394	119,381,715	117,868,605	116,295,167	115,904,474	115,902,572
Minnesota	2,252,022	2,214,306	2,175,148	2,137,510	2,105,061	2,073,900	2,065,952	2,065,946

Source: U.S Census Bureau annual data, **released end of every July**: <http://www.census.gov/const/C40/Table2/t2yu200512.txt>

Table 2u. New Privately Owned Housing Units, Authorized Unadjusted Units for Regions, Divisions, and States

December	2005 Year-to-Date						Num of Structures With 5 Units or More
	Total	1 Unit	2 Units	3 and 4 Units	5 Units or More	5 Units or More	
United States	2,147,617	1,681,184	39,402	44,558	382,473	22,024	
West North Centra	118839	95,144	3,090	2,879	17,726	1,092	
Iowa	16,733	12,712	322	495	3,204	187	
Kansas	14,404	11,814	552	361	1,677	137	
Minnesota	35,877	29,276	312	500	5,789	313	
Missouri	31,278	24,732	1,586	1,026	3,934	266	
Nebraska	10,922	9,547	162	99	1,114	83	
North Dakota	3,835	2,186	58	118	1,473	62	
South Dakota	5,790	4,877	98	280	535	44	

Residential buildings, 2005

Total housing units	2,252,022
New housing units	37,716
Existing housing units	2,214,306
Ratio of new units to existing units	0.02
Total residential electricity sales (GWh)	21,743
Estimated electricity use in new residential units (GWh)	370
Appliances multiplier	0.58
Electricity use for appliances - new residential buildings (GWh)	215
Distribution renewable penetration	5%
Energy savings from distributed renewables (GWh)	18.52

Commercial buildings, 2005

Ratio of new to existing units	0.02
Total electricity energy use (GWh)	21,985
Energy intensity correction factor by climate zone and vintage	0.23
Percentage of electricity for lighting	54%
Commercial electricity used for lighting for new buildings (GWh)	49
Distribution renewable penetration	5%
Energy savings from distributed renewables (GWh)	2.46