



Chapter 5 - Other Important Issues for Transmission Expansion

During the course of the RMATS investigation of potential new transmission additions, several important issues were raised which the Steering Committee felt needed additional analysis and inclusion in the RMATS Report. These were the transmission siting and permitting process, efficient use of the existing transmission system, and new transmission technologies which might be used in the future transmission system.

A. Transmission Project Review and Permitting Process

Once potential transmission projects have been identified in the planning effort and project sponsors have committed to the development of a project, the project must go through:

- The WECC regional planning process; and
- Siting and permitting processes prior to construction.

WECC Regional Planning Project Review Process

The sponsor of a major new transmission project (e.g., a project with respect to which the effects are not contained entirely within the sponsoring entity's system) should begin with the WECC Regional Planning Project Review Process which consists of the following process:

- The project sponsor initiates a project review process by letter to the WECC Planning Coordination Committee (PCC) and the Technical Studies Subcommittee (TSS) or the PCC determines that a project has significant regional impacts.
- The project sponsor notifies the PCC of the project purpose and invites stakeholders to join a Regional Planning Review Group (RPRG or Planning Review Group).
- The RPRG prepares to determine the technical merits, costs and feasibility of the stakeholder-defined Project or Project variations.
- The project sponsor submits a Regional Planning Report to the PCC addressing each of the Regional Planning Guidelines and solicites comments. See WECC Procedures for Regional Planning Project Review and Rating Transmission Facilities, Part 1A, Section 1.0.
- Following its review, the PCC issues a separate report outlining conformity of the Project to the Guidelines along with the Project report to RPPC.
- The PCC integrates and submits its assessment and outside stakeholder comments to the project proponents.
- The Regional Planning Project Review Process is completed once a final determination by the PPC is made regarding the project's conformity with the WECC Regional Planning Guidelines, and the Chair of the PCC submits a letter to the Project sponsor, the PCC members and the TSS members indicating that the regional planning process has been completed.
- Refer to the Procedures for Regional Planning Project Review and Rating Transmission Facilities for projects that desire to obtain an "accepted rating".

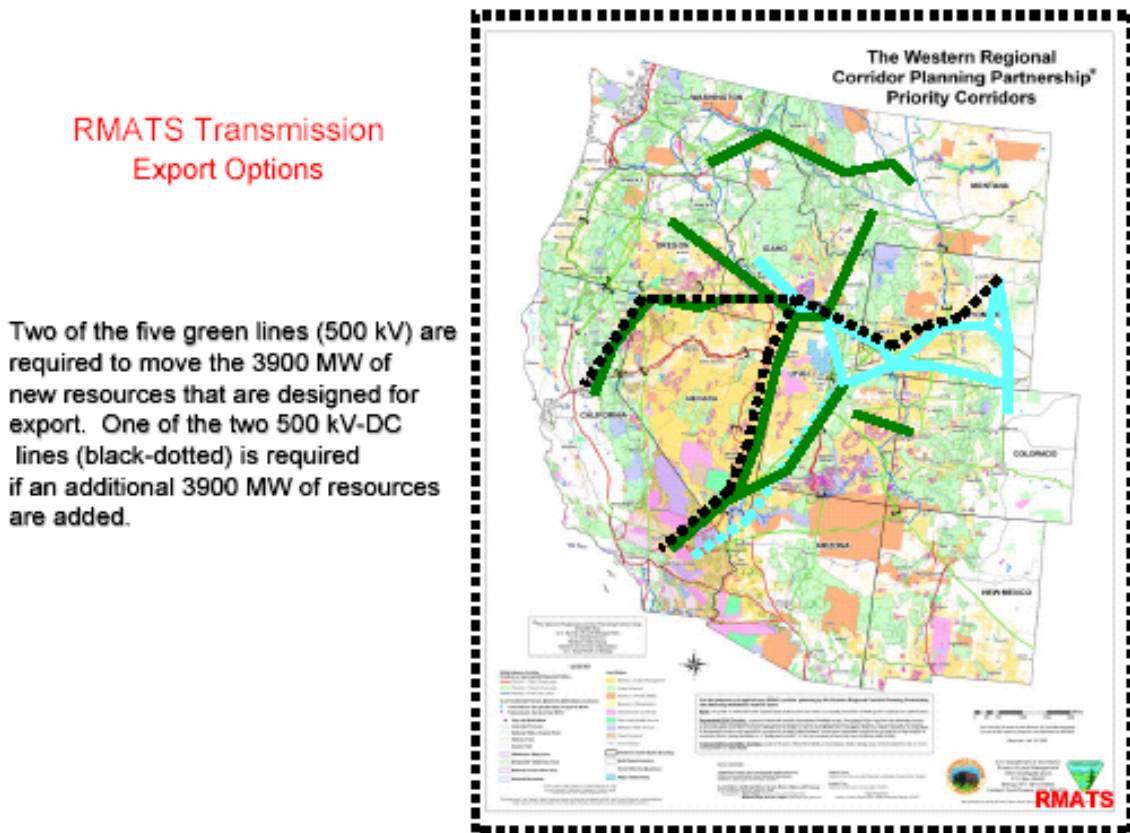
The fact that the project was developed in the RMATS planning process, with input from all interested parties, should significantly reduce the time it takes to comply with the WECC process.

Siting and Permitting

The construction of new transmission will require securing necessary permits from local, state and federal agencies, and potentially Indian Nations. Most of the transmission projects identified in the study will cross federal lands. Historically, securing necessary rights-of-way across federal lands has been among the more challenging aspects of transmission permitting in the western United States.

The Bureau of Land Management (BLM) and U.S. Forest Service are working to expedite permitting of transmission facilities across federal lands through the designation of land use corridors. If new transmission facilities are located in designated corridors the environmental analysis associated with the granting of a right-of-way can be minimized. The Western Utility Group (WUG) is providing advice to the BLM and the Forest Service on the potential designation of utility corridors. Figure 5-1 shows federal land ownership in the West and the WUG's recommendations on corridor designation. The BLM is comparing the WUG recommendations with current land uses.

Figure 5- 1: Federal Lands and Western Utility Group Corridor Recommendations



The TAWG benefited from the participation of the BLM during their identification of the routes of new transmission. Efforts were made to avoid locating new transmission in areas with land use restrictions such as national parks, wilderness areas, and areas of critical environmental concern.

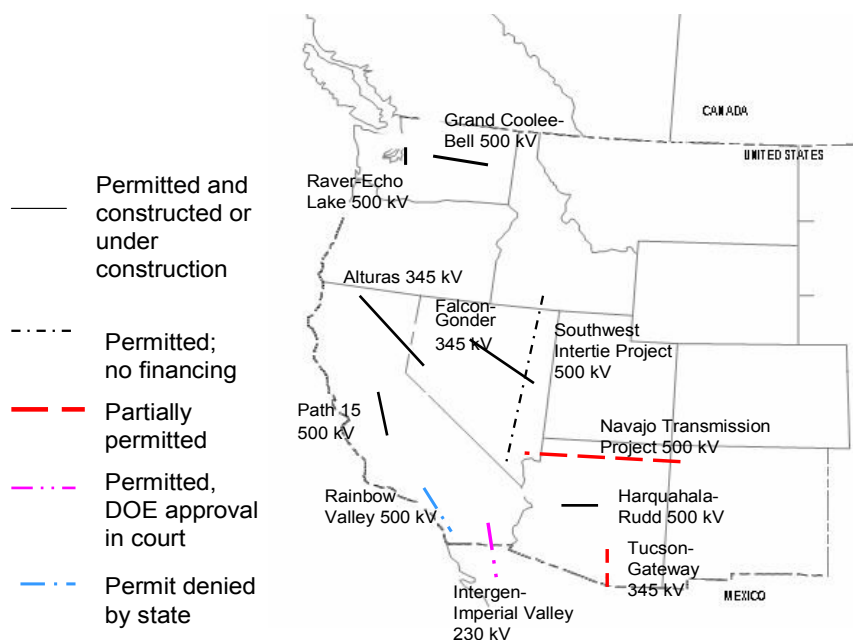
Although this will simplify the process, project sponsors will need to complete substantial additional work on the location of new transmission facilities.

Each of the states in the Western Interconnection, the Province of Alberta, and four federal agencies (Department of the Interior, Department of Agriculture, Department of Energy, the Council on Environmental Quality) have signed the Western Governors Association Transmission Permitting Protocol. This Protocol, which applies to new proposed interstate transmission lines, provides for the collaborative review of proposed transmission projects by permitting agencies. Under the Protocol, project teams would be formed consisting of the agencies with responsibility for issuing permits for a project. The project team will promote the sharing of information and analysis related to the proposed project, establish common deadlines where possible, establish common deadlines, develop information necessary for agencies to make any require determination related to the need for the project, and coordinate data requests of the applicant.

The Protocol, which was initially signed in 2002, has not yet been tested because no new interstate transmission lines have been proposed. However, the expectation is that the Protocol will provide for a more expeditious review of interstate transmission proposals and minimize the typical sequential agency review of transmission project proposals. See the Protocol on the web at <http://www.westgov.org/wieb/electric/Transmission%20Protocol/index.htm>. Many of the recommended RMATS projects are interstate in nature and, at the discretion of the governors of the states involved, can trigger the Protocol.

Figure 5-2 shows the status of transmission projects of 345 kV and higher that have entered the permitting process in recent years.

Figure 5- 2: Status of Recent Transmission Proposal 345 and Above



RMATS intends to collaborate with the National Council on Electricity Policy to develop a workshop on transmission siting in the Intermountain West.

For an illustration of federal agency permitting requirements that may apply to a proposed transmission line, see Appendix C3a. State permit requirements and processes vary by state. See <http://www.westgov.org/wieb/electric/Transmission%20Protocol/index.htm> for an overview of state permitting laws and regulations in Western states.

Rocky Mountain State Siting Requirements

COLORADO

Summary/Overview

There is no single governmental agency in Colorado responsible for transmission facility siting, and local governments have siting authority for transmission lines. A regulated utility seeking to build a transmission line is required to obtain a certificate of public convenience and necessity (CPNC) from the Colorado Public Utilities Commission (PUC).

Local governments have primary siting authority for power plants in Colorado. Non-utility builders of power plants in Colorado are not required to obtain approval for construction from the PUC. A regulated utility seeking to build a power plant, however, is required to obtain a CPCN from the PUC.

The PUC has a role if the non-utility builder of new power plant wishes to sell any electricity produced by the plant to a utility regulated by the PUC, and its Least Cost Planning (LCP) rules require regulated investor-owned utilities to acquire resources through a competitive resource acquisition process.

Transmission Certificates of Public Convenience and Necessity

According to Colorado PUC Rule 4, CCR 723-3-18, each Colorado electric utility is required to annually file information concerning any proposed new construction or extensions of transmission projects for the next three calendar years. The PUC then determines which projects are not required to obtain a CPCN and those for which it must file an application for a CPCN. Utilities are required to address the concept of prudent avoidance with respect to the planning, siting, construction, and operation of transmission facilities. Prudent avoidance means striking a balance between potential health effects of exposure to magnetic fields and the cost and impacts of mitigation of such exposure.

Recent Colorado PUC interstate transmission project approvals

In 2001, the PUC granted Public Service Company of Colorado (PSCo) a certificate of public convenience and necessity to construct a 345 kV transmission line from Lamar, Colorado to the Colorado-Kansas border and to install a high voltage direct current converter at Lamar. This transmission line would connect the asynchronous transmission grids of the Eastern interconnection and the Western Interconnection. During 2001, the PUC also granted Tri-State Generation and Transmission Association a certificate to construct a new 230 kV transmission line between southwestern Colorado and northeastern New Mexico. The PUC approved a number of transmission projects for PSCo aimed at increasing the reliability of electric service within Colorado, especially in the Denver-Boulder areas.

Appeal of local government siting decisions

According to Colorado Revised Statutes (C.R.S.) §29-20-108, a public utility may, under certain circumstances, appeal a local government land use decision concerning transmission lines to the PUC. In undertaking an appeal, the utility must show the reasons why the local government action would unreasonably impair the ability of a public utility or power authority to provide safe, reliable, and economical service to the public.

Eminent Domain

The process under which a utility can appropriate public land for the public use by the exercise of eminent domain is described beginning at §38-3-101 C.R.S. The right of eminent domain is exercised by presenting a petition in district court of each county. The process under which a utility exercises eminent domain over private lands is described at §38-5-105 C.R.S.

Recent major transmission projects

In 2001, the Colorado PUC approved two interstate transmission projects. The PUC granted Public Service Company of Colorado, a CPCN to construct a 345 kV transmission line from Lamar, Colorado to the Colorado-Kansas state line and to install a HVDC converter at Lamar. This line would provide a connection between the Eastern and Western Interconnections. Tri-State Generation and Transmission Association received a CPCN to construct a new 230 kV transmission line between southwestern Colorado and northeastern New Mexico. The PUC has also approved a number of transmission projects aimed at increasing reliability within Colorado, especially the Denver-Boulder area.

IDAHO

The siting of electric transmission lines in Idaho is not centralized in one government entity. The Governor's Office is the point of contact for coordinating the siting and review of transmission facilities.

Utility Regulation

The Idaho Public Utilities Commission has jurisdiction over transmission lines being built by public utilities, exercised through a certification process. See *Idaho Code* § 61-526. Utilities may not need to obtain a certificate of public convenience and necessity if they are merely extending a transmission line within their authorized service territories so long as the new lines do not interfere with the operation of any other utility line. *Id.*

Eminent Domain/Right-of-Ways

State law provides that utilities and others may exercise the right of eminent domain to acquire right-of-ways under *Idaho Code* § 7-701(11). For a transmission line of 230 kV or higher to be constructed over private property actively devoted agriculture, requires a public meeting regarding the transmission line's location. *Idaho Code* § 7-704(4). In addition, Idaho law provides that transmission lines may be constructed along or over any public roads except within incorporated cities so long as such lines do not inconvenience the public use of the roadway. *Idaho Code* § 62-705.

Counties/Cities

County and city siting requirements varies. Idaho's Land Use Planning Act requires that county and city planning and zoning commissions adopt a "Comprehensive Plan" that includes an analysis of "utility transmission corridors." *Idaho Code* § 67-6508(h). Persons wishing to construct transmission lines should contact the County/City Planner in the affected areas to discuss the necessary

permitting requirements. Compliance with utility right-of-way regulations, subdivision regulations and appropriate use in zoned areas are among the subjects to discuss. Some counties and cities will have additional informational requirements. Cities are also authorized to regulate the construction of transmission lines within city limits. *Idaho Code* § 50-328.

Environmental Permitting

Entities constructing transmission lines would seek air, water, and wastewater permits from the Idaho Department of Environmental Quality as appropriate for the specific construction project location.

MONTANA

Siting

Montana's transmission siting process is centralized in the Department of Environmental Quality (DEQ) under the Major Facility Siting Act of 2003 (the MFSA, § 75-20-101, *et seq.*, MCA), which consolidates most permitting functions into a single process. Under the MFSA, a large transmission line may not be constructed or operated in Montana without a Certificate of Compatibility issued by the DEQ. The MFSA process considers environmental resources, socioeconomic impacts, and costs; provides for public input; and provides a coordinated method for processing all authorizations needed for regulated facilities.

Lines Covered by the MFSA and Exceptions

Transmission lines are covered by the MFSA if they have a design capacity of more than 69 KV, except for 1) lines 230 KV or less which are 10 miles or less in length, 2) lines of less than 230 KV if the person planning to construct it has obtained right-of-way agreements or options from more than 75% of the owners who collectively own more than 75% of the property along the centerline that follow public notification procedures; and 3) lines less than 150 miles long which extend from an electrical generation facility, as defined in 15-24-3001(4), MCA, to the point of connection to a regional transmission grid at an existing substation or other facility for which the person planning to construct the line has obtained right-of-way agreements or options for a right-of-way from more than 75% of the owners who collectively own more than 75% of the property along the centerline.

Required Findings Prior to Construction

Before it can issue a Certificate of Compatibility, the DEQ must make a number of findings and determinations in a public process about the need for the line, probable environmental impacts and how they are minimized, considering available technology and the nature and economics of alternatives. Regarding transmission lines, other determinations include

- (a.) what part, if any, of the line or aqueduct will be located underground;
- (b.) *that the facility is consistent with regional plans for expansion of the appropriate grid of the utility systems serving the state and interconnected utility systems; and*
- (c.) *that the facility will serve the interests of utility system economy and reliability.*

The DEQ must also find:

- (a.) that the location of the facility as proposed conforms to applicable state and local laws and regulations, except that the department may refuse to apply any local law or regulation if it finds that, as applied to the proposed facility, the law or regulation is unreasonably restrictive in view of the existing technology, of factors of cost or economics, or of the needs of consumers, whether located inside or outside the directly affected government subdivisions;
- (b.) that the facility will serve the public interest, convenience, and necessity;

(c.) that the department or board has issued any necessary air or water quality decision, opinion, order, certification, or permit as required by 75-20-216(3), MCA; and

(d.) that the use of public lands for location of the facility was evaluated and public lands were selected whenever their use is as economically practicable as the use of private lands.

Appeals and Other Laws

Appeals to the Board of Environmental Review may be taken within 30 days. Local governments may not override a Certificate issued by DEQ under MFSA ; but, when lines are excluded from regulation under MFSA, other state and local laws that would have been preempted by the MFSA would apply. In any case, a project sponsor must obtain easements or permits to cross any school trust, highway, park or other land owned by the State of Montana.

Eminent Domain

State law provides that utilities and others may exercise eminent domain authority under Title 75, Chapter 30, Montana Codes Annotated (http://data.opi.state.mt.us/bills/mca_toc/70_30.htm). If a project sponsor must condemn land for a transmission line, the court could not consider any location for the line except the one for which a Certificate of Compatibility was issued under the MFSA.

UTAH

Summary/Overview:

There is no single Utah State government agency with primary responsibility for transmission facility siting. Various agencies need to be contacted to determine the necessary requirements for the specific proposed project.

Construction of new generation and transmission facilities generally requires receipt of a CPCN from the Utah Public Service Commission although there are exceptions to this requirement. Federal agency permitting is important in Utah, as 65 percent of the land is under federal ownership.

Public utilities can exercise the power of eminent domain pursuant to the requirements of UCA 78-34-1(8).

The last major transmission project constructed in Utah was the Sigurd-Red Butte-Nevada Border 345 kV line which became operational in July 1990. Following a Utah Power and Light request on September 25, 1987, the Commission granted a certificate of convenience and necessity for the line on December 1, 1987.

Certificate of Convenience and Necessity.

The Utah Public Service Commission has jurisdiction over the construction and operation of electric facilities. In accordance with Utah Code Ann. § 54-4-25, PacifiCorp “may not establish, or begin construction or operation of a line, route, plant or system, without having first obtained from the commission a certificate that present or future public convenience and necessity does or will require the construction.” The foregoing requirement to obtain a certificate is not required for an extension:

- a. within any city or town within which it has lawfully commenced operations;
- b. into territory, either within or without a city or town, contiguous to its line, plant, or system that is not served by a public utility of like character; or

- c. within or to territory already served by it, necessary in the ordinary course of its business.

Challenges may be brought by any other public utility claiming to be injuriously effected by the new facilities. The affected utility is required to file a complaint with the commission and the commission may impose conditions or prescribe terms concerning the new construction that are just and reasonable.

Right of Eminent Domain.

Electric light and electric power lines and sites for electric light and power plants are deemed public uses in Utah for which the right of eminent domain may be exercised. See Utah Code Ann. § 78-34-1(8). Before property can be taken, a utility must demonstrate the following four elements:

- a. that the use to which it is to be applied is a use authorized by law;
- b. that the taking is necessary to such use;
- c. that construction and use will commence within a reasonable time as determined by the court;
- d. if already appropriated to some public use, that the public use to which it is to be applied is a more necessary public use.

Purpose and necessity of a project is typically a matter of judicial scrutiny. Under Utah case law, a court will not preclude a condemnation action based on a landowner's opinion that a better or different route is available. However, in the planning phases of a route, a utility should consider a rarely used statute that provides that the project must be "located in a manner which will be most compatible with the greatest public good and the least private injury."

Electrical Facility Review Board Act.

Pursuant to Utah law, local governments are precluded from imposing certain non-standard requirements without paying the incremental cost difference. A local government may require or condition the construction of a facility (defined as a transmission line in excess of 34,000 volts or a substation) if:

- a. the requirements or conditions do not impair that ability of the public utility to provide safe, reliable and adequate service to its customers; and
- b. the local government pays for the actual excess cost (costs exceeding standard costs) resulting from the requirements or conditions.

The Electrical Facility Review Board or the commission may provide exceptions to this requirement and require the utility to pay the differential cost. The board is essentially an appellate review for mediating cost differentials and reasonability of requirements and conditions. It is important to note the members of the board have never been appointed and the provisions of this statute have not been used except during permitting hearings to remind local governments that they cannot impose requirements above standard construction without paying the differential costs.

State Agency Contacts

Public Service Commission of Utah (certificate of convenience and necessity)
Utah Department of Commerce, Division of Public Utilities
Utah Department of Environmental Quality
 Division of Air Quality
 Division of Solid & Hazardous Waste

Division of Water Quality
Utah Department of Natural Resources
Utah Energy Office
Division of Wildlife Resources (state land issues)
State Parks and Recreation (state land issues)
School and Institutional Trust Lands Administration Surface Management (school land issues)
Labor Commission, Occupational Safety & Health Division
County and Local Governments

Websites:

<http://www.psc.utah.gov/>
<http://www.publicutilities.utah.gov/EL003%20Elect%20Siting.html>
<http://www.commerce.state.ut.us/>
<http://www.eq.state.ut.us/>
<http://www.nr.utah.gov/>
<http://www.utahtrustlands.com/>
<http://www.uosh.utah.gov/>

Regulatory Citations and Links if applicable:

Utah Code 54-4-25 and Utah Code 11-13-304 Commission's authority over Certificates of Convenience and Necessity.

Utah Code 54-8c for Public Utility High Voltage Overhead Lines notification and communications requirements

Utah Code 54-7-24 and Utah Code 54-7-25 provide Commission authority to order injunctions or penalties for any public utility violations of compliance with Title 54 or any rule promulgated there under.

Utah Code 78-34-1 (8) for persons exercising eminent domain.

Utah Code 54-14 for the Electrical Facility Review Board Act.

http://www.le.state.ut.us/~code/TITLE54/htm/54_04026.htm

http://www.le.state.ut.us/~code/TITLE11/htm/11_09033.htm

WYOMING

The siting of electric transmission lines in Wyoming is not centralized in one governmental entity.

Utility Regulation

The Wyoming Public Service Commission has jurisdiction over transmission lines being built by public utilities, exercised through a certification process. See W.S. § 37-2-205. Under this statute, where a certificate is requested for a line of 230 KV or greater, the Commission must publish notice and give all affected landowners actual notice of hearing by registered mail. Commission certificates for such lines must be conditioned "so that no construction of the line is authorized until all right-of-way for the line has been acquired." By rule, the Commission may require a certificate of public convenience and necessity for public utilities' transmission lines designed to operate at 69 KV and above and which are longer than three miles, unless it is construction necessary in the ordinary course of business.

Right-of-Way/Ways of Necessity

Electric transmission right of way may be acquired by cities, towns, utilities and others using Wyoming's eminent domain laws. See W.S. §§ 1-26-801 through -817. Beyond this, "any person, association, company or corporation authorized to do business in this state may appropriate by condemnation a way of necessity over, across or on so much of the lands or real property of others as necessary for the location, construction, maintenance and use of . . . electric power transmission lines . . ." W.S. § 1-26-815 A condemnation proceeding regarding a facility for which a certificate of public necessity and convenience is required cannot go forward until the certificate has been issued. W.S. § 1-26-817. Condemnation actions are brought in Wyoming's District Courts. See Title 1, Chapter 26, Articles 5-8, the Wyoming Eminent Domain Act.

State Environmental and Siting

A storm water permit from the Wyoming Department of Environmental Quality would be needed during construction if the surface disturbance exceeds 1 contiguous acre. Lines not exceeding 500 KV are exempt from the Wyoming Industrial Siting Act. See, W.S. § 35-12-119. Certain information must still be filed regarding such exempt activities. See W.S. § 35-12-109(a)(iii), (iv), (v) and (viii). Persons wishing to construct lines crossing or running along roads and highways in Wyoming, including interstates, should first be discussed with the Wyoming Department of Transportation, Utilities Section.

Counties

County requirements vary. Persons wishing to construct transmission lines should contact the County Planners in the affected counties (or the County Attorney in the absence of a Planner) to discuss the necessary compliance. Compliance with county utility right-of-way regulations, subdivision regulations and land use plans (concerning zoned county areas) are among the subjects to discuss. Some counties will have additional informational requirements.

B. Increased Use of Existing Transmission System

Making the most efficient use of existing transmission infrastructure is a prerequisite for persuading regulators, political leaders and the public, new transmission construction is truly needed. Another concern, raised by wind power representatives at the first RMATS Stakeholder Meeting, was that since many generation projects, and particularly wind projects, can be developed, permitted and built in less than two years, the study time frame of 2008 to 2013 (inherited from SSG-WI) was too distant. In response, RMATS established a Regulatory and Operational Issues Work Group (ROIWG) to explore opportunities to make more efficient use of existing transmission assets without new transmission construction.

In the RMATS region (as in many others), there is no firm Available Transfer Capacity (ATC) available on many transmission paths, even while some paths may be congested for less than 20-50 hours per year. Further, this minimal physical congestion often is during times of low wind output. There may be physical capacity on some paths in the current system to move significant amounts of wind energy, but no access to it under Order 888 tariffs. Wind projects cannot be financed using short-term, non-firm point-to-point service, (the only current alternative to firm service) because non-firm transmission service has no curtailment priority.

The ABB Market Simulation used in the RMATS economic study does not consider regulatory or contractual constraints or operating practices, and therefore does not address tariff limitations. By broadening the scope of the RMATS study beyond economic modeling, RMATS has considered other alternatives to transmission investment. The ROIWG developed a Work Plan to study the

existing operational characteristics of several representative transmission paths important to wind developers, and address whether certain tariff or operational changes could result in increased utilization of the paths. (See Appendix F) It was hoped that this effort could determine whether such tariff and operational changes could enable substantial MW of new resources to connect to the existing transmission system in the near future and over the 4-9 year period before physical transmission upgrades could be permitted and built. These changes would, hopefully, stand on their own merits and thus complement the transmission expansions contained in Recommendations 1 and 2.

The ROIWG conducted its work through numerous conference calls and two meetings in Denver and Portland. A synopsis of the results of the Work Group to date follows:

ROIWG Case Study Results

The ROIWG began by reviewing a study of three constrained transmission paths in the West. This study was performed by Peak Power Engineering under a US DOE contract administered by NREL. The purpose of the study was to analyze recent historical power flow data to determine the amount of unused transmission capacity that may be available to new generation resources. The study used geographically relevant wind speed and wind farm output data to correlate wind power availability with transmission capacity. The transmission paths analyzed were the Wyoming to Colorado Front Range (TOT3), Southwestern Wyoming to Utah Wasatch Front (West of Naughton), and the Montana Northwestern Energy to Bonneville Power Administration (Montana-Northwest).

The analyses are general in nature and do not imply that specific generation projects are viable. An OASIS interconnection request and a system impact study are necessary for any new transmission interconnection.

TOT3

The TOT3 case study utilized hourly data from the WECC EHV database of the overall path rating, power flow, and schedule for 2001 through 2003. Several factors affecting the available transfer capacity were identified by workgroup participants at the ROIWG meeting in Denver. Issues such as the division of ownership, unscheduled power flow (loop flow), and reserve margins decrease the amount of ATC that is available to a generator.

The study analyzed two cases to determine the available capacity:

Case 1

The physically available or Unused Transfer Capacity (UTC) was calculated to identify the total capacity based solely on the historical data.

Case 2

The total capacity available for use on an hourly basis was approximated as the hourly ATC, or hATC. This was accomplished by multiplying the UTC by a 60% uncertainty factor. The hATC approximates the overall capacity of the path that may be available to additional generation resources under the proposed conditional firm tariff.

The UTC and the hATC were used in their respective cases to evaluate curtailment likelihood of each of the generation resources. Table 5-1 compares the average curtailment of the three years studied for both cases. **Error! Reference source not found.** Table 5-2 makes the same comparison as Table 5-1 for a 500 MW wind farm.

Table 5- 1: Average Curtailment Based on Hourly ATC, in Percent of 100MW Wind Farm Total Output

	100 MW Wind Farm				100 MW Constant Output			
	UTC Curtailed Wind	UTC Non- curtailed Wind	hATC Curtailed Wind	hATC Non- curtailed Wind	UTC Curtailed Constant Output	UTC Non- curtailed Constant Output	hATC Curtailed Constant Output	hATC Non- curtailed Constant Output
Winter	0.02%	99.98%	0.07%	99.93%	0.02%	99.98%	0.04%	99.96%
Spring	0.14%	99.86%	0.56%	99.44%	0.11%	99.89%	0.38%	99.62%
Summer	2.42%	97.58%	2.87%	97.13%	2.76%	97.24%	3.63%	96.37%
Year	0.76%	99.24%	0.99%	99.01%	1.18%	98.82%	1.60%	1.60%

Note: 100% of wind farm output is an average of 372,593 MWh per year.

Table 5- 2: Average Curtailment Based on Hourly ATC, in Percent of 500 MW Wind Farm Total Output

	500 MW Wind Farm				500 MW Constant Output			
	UTC Curtailed Wind	UTC Non- curtailed Wind	hATC Curtailed Wind	hATC Non- curtailed Wind	UTC Curtailed Constant Output	UTC Non- curtailed Constant Output	hATC Curtailed Constant Output	hATC Non- curtailed Constant Output
Winter	3.05%	96.95%	22.23%	77.77%	3.99%	96.01%	30.03%	69.97%
Spring	4.42%	95.58%	16.04%	83.96%	5.89%	94.11%	25.26%	74.74%
Summer	11.83%	88.17%	31.95%	68.05%	15.75%	84.25%	43.59%	56.41%
Year	6.25%	93.75%	24.89%	75.11%	9.24%	90.76%	34.92%	65.08%

Note: 100% of wind farm output is an average of 1,862,967 MWh per year.

Table 5-1 and Table 5-2 show that curtailment due to insufficient capacity is most likely to occur during the summer operating season. The tables also illustrate the effect of the two cases in the amount of curtailment incurred. Most notable in Table 2, the uncertainty factor increases the likelihood of curtailment for the year from 6.25% to 24.89% for a 500 MW wind farm.

The study also found that on a yearly and seasonal basis, a wind farm is less likely to be curtailed due to transmission constraints than a constant-output generator of the same nominal size. This is due to the lower plant factor (30-40%) for wind which results in a lower probability of coinciding with transmission constraints that require curtailments. The wind farm also is curtailed less as a percent of total capacity output versus traditional generator resources.

The path is owned by four entities, each of which can schedule up to its allocation of the real-time Total Transfer Capability (TTC). Each entity's allocation is proportional to its percent ownership of TOT3. One entity who owns TOT2 transmission is a parent company made up of three separate companies. Curtailment of schedules can occur if an entity over-schedules its portion of the TTC, even if other entities have not reached their schedule limits. In the case of the parent company, each separate constituent company may use all of the ATC available to the parent company as long as the

other constituent companies do not use their share of the ATC. The data used for the study does not show these interactions between entities.

Having studied TOT3 as a single path for the purpose of simplifying the analysis, the ROIWG recognizes that it is not practical to assume that all of the unused capacity can be made available as ATC. The complex ownership and multiple separate lines in the TOT3 path make it difficult to determine potential ATC available, without detailed power flow studies which are based on actual points of receipt and delivery. The study was not able to take into account these issues that would limit the ATC available on TOT3. The purpose of the analysis was to demonstrate that there may be the potential, as identified by future detailed studies, for additional utilization of the system if new tariff products are developed and implemented as described below.

West of Naughton

The West of Naughton case study was conducted using actual power flow data for the path obtained from PacifiCorp. Due to recent system changes, load growth, and the development of 144 MW of new wind power brought on line in December 2003, the data set used for West of Naughton is no longer relevant to the path. Furthermore, West of Naughton is operated as an “internal” path, and is therefore not specifically scheduled. New data that is indicative of the system changes at West of Naughton is required to complete a meaningful study of this path.

Montana-Northwest

Several key issues were identified in the Montana-Northwest case study at the ROIWG meeting in Portland. The data that is stored in the WECC EHV database for the Montana-Northwest path is missing significant portions of real-time data such as hourly schedule and path rating. This is due to data recorder errors and problems with the reporting process.

The incompleteness of the data used for the path, and mismatched time periods between the transmission data and the wind data sets limit the conclusions that can be drawn from the preliminary results. The study method was similar to that used for TOT3 in that it evaluated the overall capacity of the Montana-Northwest path. The preliminary results suggest that a 500 MW wind farm has a curtailment likelihood of 1.25% of its yearly output, whereas a constant-output plant of 500 MW has a curtailment likelihood of 3.53% of its yearly output. It is important to note that the curtailment values may be significantly overstated due to the lack of real-time transmission data. Additionally, the effect of reduced transmission capacity for wind farm locations east of Garrison, MT or the Amps line was not readily quantifiable.

Additional study work for the Montana-Northwest path will require more complete scheduling data or ATC data. More complete and reliable data recording is also necessary to conduct an accurate analysis of the historical loading and available capacity. It may be necessary to acquire path data east of Garrison in order to accurately evaluate the capacity for wind resources in central and eastern Montana.

Case Study Conclusions

The results of the case studies illustrate several key issues regarding the assessment of available capacity of the paths:

- a. More efficient use of TOT3 may be possible by reviewing the operating practices that divide ATC among owners of the path and performing more detailed studies on path utilization.

- b. Improved data collection and completeness of the WECC EHV database will aid in the accuracy of future studies.
- c. The addition of posted ATC values to the EHV database may be helpful in comparing unscheduled capacity to posted ATC. This may lead to improved calculation methods for ATC, and ultimately to more efficient use of the transmission system.

The ROIWG Case Study provided sufficient information about the potential for increased utilization of the existing system to prompt the Work Group to pursue the development of new transmission tariff products as the principal output of the group's effort.

For additional information related to this Case Study, see Appendix H.

ROIWG Tariff Development Results

In the ROIWG meetings in Denver and Portland, the Work Group discussed numerous innovative tariff considerations which could pave the way to potential additional utilization of the existing transmission system. Tariff innovation ideas focused on a possible "conditional firm" product which would offer firm service except for certain defined periods, and a long-term "priority non-firm" product that would offer a high priority non-firm service on a long-term contract basis. The ROIWG has informally developed generic draft wording for OATT tariff modifications to include these tariff innovations.

Many generators and utilities feel that they can work with a transmission product with a limited curtailment risk during a few months of the year. Intermittent generators like wind, do not use the full transmission capacity in their contracts, and will be less impacted by a small curtailment risk, which may not coincide with their generation patterns. Generators and utilities are not comfortable signing twenty-year contracts for new resources with the risks inherent in transmitting that power strictly via non-firm transmission service (available for only one year). Since new transmission lines to serve generators cannot be developed in the near term future, innovative transmission tariff products that make more efficient use of the transmission system, and particularly constrained paths, will allow for new generation alternatives sooner rather than later. A "conditional-firm" transmission tariff product can provide a bridge until more transmission can be added to the system. It can also provide additional revenue for existing transmission owners. A long-term priority non-firm tariff product could also be useful under certain circumstances.

Conditional-Firm Service Tariff Product

The conditional-firm transmission product would be for firm service during a defined period of the year and conditional-firm service for the balance of the year. Conditional-firm would be curtailed prior to firm service, but after all non-firm service. This priority of curtailment combined with a clear understanding of the curtailment risk during the conditional months will give generators and utilities more confidence in their ability to move power to loads.

The Conditional-Firm Service would have the following characteristics:

- Conditional-firm service would be offered to customers when ATC to meet a long term firm request is not available for the full amount of the request for twelve months of the year.
- Conditional-firm service would be offered for the same duration as long-term firm.

- Conditional-firm service would be a combination of firm service for a set number of months of the year with service curtailment for the remaining of the year.
- This curtailment priority would mean that the transmission service would be curtailed after non-firm service but prior to firm service and the service would be subject to curtailment only as necessary to maintain system reliability and not for economic or other non-reliability reasons.
- Customers purchasing conditional-firm service would be given detailed information about curtailment risk, i.e. the hours of likely curtailment, during conditional service months of the year in advance of their commitment.
- Customers purchasing conditional-firm service would have a right to retain their original queue status.
- This service would be appropriately priced relative to long-term firm service, reflecting its higher potential for curtailment.

The ROIWG has been working on draft generic OATT tariff language to further define the conditional-firm tariff product. This draft is a work-in-progress that will likely be subject to further analysis and modification by interested parties.

Priority Non-Firm Service Tariff Product

Point to point transmission service is defined in OATT-compliant tariffs as either firm or non-firm. NERC and tagging processes have defined seven levels of firmness for point-to-point service: 1) redirect from secondary points on the system, 2) hourly non-firm, 3) daily non-firm, 4) weekly non-firm, 5) monthly non-firm, 6) network service from secondary non-Network resources, and 7) firm. These categories allow transmission operators to curtail by level of firmness. The ROIWG has pursued the development of a non-firm transmission tariff product offering a new “category 5.5” service, available long term, in which the customer would agree to be curtailed when the operations were constrained.

The requirements associated with network service (priority 6) and that non-firm service is not available for periods longer than one year is an impediment for new intermittent generators to procure financing. Yet there is transmission capacity available on most paths in many hours of the year. A priority Non-Firm transmission product could enable generators to use this capacity. Given the current point-to-point tariff and the associated priority levels that range from 1-7, it appears that a level 5.5 priority would be a logical candidate for tariff modification. This product would have a lower priority than firm service, and would therefore be subject to curtailment before any firm curtailment. A level 5.5 priority would also be curtailed prior to curtailment of a secondary network resource, but would receive priority over all other non-firm service. Because Non-Firm Point-To-Point Transmission Service applies to non-network loads and resources, a long-term product would be useful for either merchant wind plants or for entities that do not have a network agreement in place.

The Long-Term Non-Firm Point-To-Point Transmission Service Product would have the following characteristics:

- Long-Term Non-Firm service would be offered to customers when there is sufficient capacity available for portions of the year.
- Long-Term Non-Firm service would be offered for a period of up to ten years.

- The curtailment priority would mean that the transmission service would be curtailed after non-firm priorities 1-5 but prior to secondary service priority 6 and firm service priority 7.
- Customers purchasing long-term non-firm service would be given detailed information about curtailment risk in advance of their commitment.
- Customers purchasing long-term non-firm service would have a right to retain their original queue status.
- Pricing for this service would be based on its proportionate use of the system.

The ROIWG has been working on draft generic OATT tariff language to further define a priority non-firm service tariff product. This draft is a work-in-progress that will be subject to further analysis and modification by interested parties.

Conclusion

The ROIWG will continue to work on draft generic OATT tariff language to further define these tariff products in RMAIS Phase II with the goal of persuading target utilities to file these products with the FERC.

C. Emerging Transmission Technologies

The identification of transmission solutions to reduce VOM costs in 2013 focused on the addition of new 230 KV, 345 KV, and 500 KV transmission lines, the addition of series compensation, and installation of phase shifters. New technologies are being developed to increase transfer capacity on existing lines within existing corridors, including advanced composite conductors, more compact transmission line configurations, Flexible AC Transmission Systems and new sensors and control devices. See Appendix C.3.b for a description of new transmission technologies.

Several of these technologies have the potential of minimizing environmental impacts and local opposition to transmission expansion projects. Project sponsors should carefully examine the application of such technologies in their transmission plans.