

RTO WEST

Implementation, Needs & Cost Analysis

As of: August 31, 2000

RTO West Implementation Work Group

1. Introduction

1.1 Implementation Assumptions

- RTO West will operate one control area, and therefore, will have all the responsibilities of a control area. For example: RTO West must meet NERC control performance criteria (CPS1, CPS2, and DCS), and, must fulfill FERC requirements. RTO West must be a provider of last resort of ancillary services. In addition, RTO West may provide load following services for native loads of transmission customers.
- RTO West will comply with WSCC Minimum Operating Reliability Criteria (MORC) and NERC Policies relating to reliable system operation
- RTO West will schedule the transmission system under its control according to its tariff and applicable reliability practices.
- RTO West will manage congestion in both the pre-schedule market and in real-time. RTO West will have full authority to administer all schedules on all paths in the RTO West jurisdiction.
- RTO West will have full responsibility for security of the transmission system under its jurisdiction. RTO West will have the responsibility of a Security Coordinator as outlined in NERC security process recommendations, even though the function may be initially contracted to the Pacific NW Security Coordinator.
- RTO West will operate the transmission system to facilitate the maximum safe utilization of the grid, and to allow the competitive generation market transparent and non-discriminatory access.
- There will be (an) integration agreement(s) between RTO West and each entity connecting to RTO West facilities. This (these) agreement(s) will specify the terms and conditions for interconnection. Agreements may include, but not be limited to, RTO West jurisdiction with respect to facility operation, facility owner or customer responsibilities, voltage set-points, power factor requirements, relay standards, and generator equipment standards such as power system stabilizers, exciters, governors, etc.
- RTO West will be the provider of last resort for ancillary services to comply with FERC Order 2000 for transmission providers. These services will be provided by a competitive bidding process to the maximum extent possible. The requirements to provide such services and the compensation for these services will be specified in the individual control agreements between RTO West and each party, in FERC tariff(s), or both.
- In an emergency, RTO West will have the authority to require all connected loads and generators to take whatever actions are required to maintain system reliability. The requirements to provide such services and the compensation to be given for these services will be specified in the individual control agreements between RTO West and each party.
- RTO West will have authority to approve and disapprove requests for scheduled outages of transmission facilities operated by RTO West to ensure that the outages can be accommodated within established reliability standards. RTO West will coordinate outages to maximize the overall transfer capability of the grid. RTO West will work together with transmission owners to

coordinate performance of all required maintenance and facility upgrades in a timely manner within established State, regional and national reliability standards.

- Existing control centers may remain in service and may function in a number of capacities. They may:
 - Act as centers for RTO West switching of RTO transmission facilities in and out of service at the request of the RTO West operator;
 - Act as control areas if the transmission customer chooses to control for its own load;
 - Act as centers for RTO West by controlling generators for load following for RTO West;
 - Act as switching centers for the facility owners' sub-transmission facilities and/or distribution facilities not under RTO West jurisdiction.
- RTO West has "ultimate responsibility" for the planning and expansion of the RTO Grid. The RTO will "perform" all or the majority of the planning work.
- RTO West will archive historical data to support congestion management, market monitoring, auditing, etc.
- RTO West will acquire services and perform its functions economically and in a non-discriminatory manner.
- RTO West shall not operate a Power Exchange. It shall use market mechanisms run by third parties wherever possible to facilitate competition for the provision, purchase or sale of power products and services. However, RTO West may implement market mechanisms to run real-time markets to meet its ancillary service and balancing energy needs.

2. Characteristics and Functional Requirements

2.1 Minimum Characteristics of an RTO

In Order 2000, the FERC proposed minimum characteristics and functions for a transmission entity to qualify as an RTO. These characteristics and functions are designed to ensure that any RTO will be independent and able to provide reliable, non-discriminatory and efficiently priced transmission service to support competitive regional bulk power markets. These four minimum characteristics for an RTO are:

- Independence from market participants;
- Appropriate scope and regional configuration;
- Possession of operational authority for all transmission facilities under the RTO's control; and
- Exclusive authority to maintain short-term reliability.

2.1.1 The Basic Independence Principle (Characteristic 1) is the bedrock upon which an RTO must be built. In Order 2000, the FERC decided not to impose any specific requirements on RTO governing boards other than the general requirement that they must satisfy the overall principle

that their decision making process should be independent of any market participant or class of participants.

2.1.2 Scope and Regional Configuration (Characteristic 2) depends on appropriately addressing issues regarding how the initial boundaries are established. These issues are as follows:

- Scope and Configuration Factors;
- Regional Configuration Factors;
- Factors for Evaluating Boundaries;
- Control of Facilities Within a Region.

2.1.3 Regarding Operational Authority (Characteristic 3), the FERC concludes that those designing the RTO should have flexibility to decide how it would exercise its operational control authority. The RTO may operate the transmission system through direct physical operation by RTO employees, contractual agreements with other entities (e.g., transmission owners and control area operators) or implement a hierarchical control structure involving a combination of direct and functional control. Under these arrangements, the personnel of existing control centers might become employees of the RTO or remain employees of the control center owner, while being supervised by RTO personnel. The FERC leaves it to the discretion of the region to decide on the combination of direct and functional control that works best for its circumstances.

2.1.4 With regard to Short-Term Reliability (Characteristic 4), the FERC concludes the following:

- The RTO must have exclusive authority for receiving, confirming and implementing all interchange schedules, which are often coincident with schedules for unbundled transmission service. RTOs that operate a single control area will automatically assume this function. If the RTO structure includes control area operators who are market participants or affiliated with market participants, the RTO will have the authority to direct the implementation of all interchange schedules. The FERC remains concerned that non-RTO control area operators, who are also competitors in energy markets, have unequal access to commercially sensitive information and could use knowledge of their competitors' schedules and transactions to gain an unfair competitive advantage in the energy markets. In the event that the RTO filing includes a structure in which non-RTO control area operators receive sensitive information, it will be required that the RTO monitor for any unfair competitive advantage, and report to the Commission immediately if problems are detected. In addition, to address concerns about protecting commercially sensitive information, we will require the RTO, or any entities who operate control areas within the RTO's region that require access to commercially sensitive information, to sign agreements that separate reliability personnel and the relevant information they receive from their wholesale merchant personnel.
- The RTO must have the right to order the re-dispatch of any generator connected to the transmission facilities it operates, if necessary, for the reliable operation of the transmission system. The FERC also requires each RTO to develop procedures for generators to offer their services and to compensate generators that are re-dispatched for reliability. In order to maintain the reliability of the transmission system, the entity that controls transmission must also have control over some generation. In general, the FERC believes this control should be through a market where the generators offer their services and the RTO chooses the least cost options. This

authority does not extend to initial unit commitment and dispatch decisions for generators. However, for reliability purposes, the RTO should have full authority to order the re-dispatch of any generator, subject to existing environmental and operating restrictions that may limit a generator's ability to change its dispatch.

- The RTO must have authority to approve and disapprove all requests for scheduled outages of transmission facilities to ensure that the outages can be accommodated within established reliability standards. Control over transmission maintenance is a necessary RTO function because outages of transmission facilities affect the overall transfer capability of the grid. If a facility is removed from service for any reason, the power flows on all regional facilities are affected. These shifting power flows may cause other facilities to become overloaded and, consequently, adversely affect system reliability. The FERC encourages transmission owners to plan maintenance so as to minimize reliability effects.
- The RTO is not required to have authority over proposed generation maintenance schedules. However, the FERC acknowledges that there are reliability advantages to the RTO having this authority, and they would accept RTO proposals where the participants choose to grant the RTO such authority. In FERC's order approving the Midwest ISO, they observed "the dividing line between transmission control and generation control is not always clear because both sets of functions are ultimately required for reliable operation of the overall system." Because of this close connection between generation and maintenance of system reliability, it is essential for generator owners and operators to provide the RTO with advance knowledge of planned generation outage schedules so that the RTO can incorporate this information into its reliability studies and operations plan. However, although a generator may be required to submit its maintenance schedule to an RTO, the RTO should be prohibited from sharing that information with any other market participants, or affiliates of market participants.
- The FERC does not require RTOs to establish transmission facility ratings. They encourage, however, such ratings to be determined, to the extent practical, by mutual consent of the transmission owner and the RTO, taking into account local codes, age and past usage of the facilities.
- The FERC will determine the extent of RTO liability relating to its reliability activities on a case-by-case basis.
- The RTO must perform its functions consistent with reliability standards established by NERC (or its successor), and notify the Commission immediately if implementation of these or any other externally established reliability standards would prevent it from meeting its obligation to provide reliable, non-discriminatory transmission service.

2.2 Functions of an RTO

In addition, the FERC Order 2000 specifies that an RTO must accomplish eight functions. The RTO can provide these functions directly using its staff, or contract for provision of the service with other entities. However, the RTO remains responsible for ensuring these functions are performed satisfactorily as determined by the FERC. These functions are:

- Tariff Administration and Design (Function 1)
- Congestion Management (Function 2)
- Parallel Path Flow (Function 3)

- Ancillary Services (Function 4)
- OASIS, Total Transmission Capability and Available Transmission Capability (Function 5)
- Market Monitoring (Function 6)
- Planning and Expansion (Function 7)
- Interregional Coordination (Function 8)

3. Staffing and Organizational Requirements

In order to carry out its responsibilities, RTO West will require a dedicated staff of employees at both a primary and a backup center. This section of the report describes the following:

- Staffing Assumptions
- RTO West Organization and Staffing
- Backup Center Staff
- Comparison of Staff at other ISOs
- Labor Budget Estimate

3.1 RTO West Staffing Assumptions

Below are the basic assumptions used to develop the RTO West staffing and organization requirements:

- Technology and staffing estimates are based on “light” implementations of all functions except for a mid-range implementation of congestion management and an RTO “performs” implementation of planning;
- The congestion management protocols have not been fully developed, therefore, staffing estimates for this function (for example shift schedulers) may be low;
- Some planning staff could be located in distributed field offices, with the total number of planning staff members increasing during startup and over the next two years (initial staffing levels would accommodate either planning “perform” or “coordinate”);
- There will be one primary center;
- There will be one backup center with limited functions performed on a 24x7 basis;
- RTO West will have full responsibility for transmission security;
- Increasing RTO West functional capability to any significant degree will require additional staff and supporting equipment and facilities, at an increased cost;
- Staffing will depend upon the facilities under the operational control of RTO West, and the number of RTO functions that continue to be performed by control area operators, transmission owners or other entities;

- Some functions may be outsourced, such as physical security, reprographics, IT support, additional legal and HR support, market monitoring, and/or security coordination;
- The independent Board of Trustees will require sufficient compensation, travel reimbursement, and administrative support in order to attract recruitment and participation of highly qualified individuals on the Board;
- RTO West will not provide staff to support the following functions: Power Exchange, Retail Access.

3.2 RTO West Organization and Staffing

RTO West will be organized into eight functions: President/CEO, Chief Operating Officer, Chief Financial Officer, General Counsel, Chief Information Office, Client Services, Human Resources, and a Market Monitoring Unit. The preliminary staffing estimate is 236 FTEs. The following sections describe functions of a fully staffed “second year” RTO West organization:

3.2.1 Office of President and CEO (3 FTEs)

The President’s office will be responsible for implementation of RTO West policies, coordination with the RTO West Board of Directors, direction and coordination of activities performed by other departments, and coordination with regulatory agencies. The activities of the President’s office will include:

- Prepare annual reports;
- Prepare FERC filings;
- Respond to FERC orders;
- Conduct periodic meetings with RTO West staff;
- Conduct periodic meetings with transmission owners.

3.2.2 Chief Operating Officer (117 FTEs)

Office of the Vice President & COO (9 FTE) includes 7 FTE for the Security Coordinator

A) System Planning (19 FTEs)

System Planning staff will have the “ultimate responsibility” for planning of facilities that RTO West controls and offers service over, and lines that impact the transfer capability of these facilities. One planning engineer will be responsible to support the Board Advisory Committee’s Planning Coordination Subcommittee. The following activities have been identified for the System Planning organization:

- Determine the capability of the RTO West Grid and the location of bottlenecks;
- Assess the reliability of the RTO West Grid;
- Perform planning at distributed field offices;
- Provide information developed in the process of performing reliability assessments to the market;
- Identify and evaluate alternatives upon receipt of a request from the market;
- Coordinate expansion activities;

- Upon request of PTO, determine benefits and allocate costs of multi-purpose projects.

B) System Operations (49 FTEs)

Shift operations staff will be responsible for control, grid monitoring, congestion management, switching and security of the transmission system during real-time operations and supervision of the backup center. 30 shift employees will staff 5 consoles on a 24X7 basis. There will be three positions for outage coordination.

There will be twelve operations engineers (one specifically responsible for compliance monitoring and reporting and one responsible for support of the RTO Board Advisory Committee's Operating Subcommittee). Operations, Planning & Compliance staff will provide real-time technical support to the operations staff including the following activities:

- Perform short-term planning studies;
- Perform OTC studies;
- Monitor grid voltage regulation;
- Develop operating procedures;
- Perform transmission congestion studies;
- Review generator outage schedules;
- Monitor and report compliance with NERC and WSCC Standards and Measures;
- Coordinate scheduled outages.

C) Scheduling & OASIS (40 FTEs)

12 next hour schedulers will staff two consoles on a 24X7 basis, one at the primary center and one at the backup facility.

This staff would also be responsible for forecasting, long-term scheduling, OASIS administration, coordination of transmission reservations, after-the-fact accounting and coordination of requests for ATC calculations. One staff member will be responsible to support the Board Advisory Committee's Market Interface Subcommittee.

3.2.3 Chief Financial Officer (37 FTEs)

The financial services organization will be responsible for the accounting, bookkeeping, billing, settlements, and financial planning functions of the RTO. The following activities have been identified for the financial services organization:

- Define the processes and procedures for transmission service settlement;
- Prepare transmission customer invoices;
- Administer accounts payable and accounts receivable;
- Administer payroll;
- Manage financial risk;
- Maintain general ledger;
- Develop and administer internal audit policies and procedures;
- Develop and administer purchasing procedures;
- Provide financial analysis support.

The CFO will also be responsible for Facilities Management functions, including physical security.

3.2.4 General Counsel (5 FTEs)

The General Council's office will be responsible for providing legal counsel to RTO West. The following activities have been identified for this department:

- Represent RTO West in legal proceedings;
- Administer dispute resolution;
- Review and interpret FERC and State Regulatory Authority filings;
- Prepare FERC and State Regulatory Authority filings and proceedings.

3.2.5 Chief Information Officer (46 FTEs)

The Information Services organization will be responsible for all computer infrastructure activities including application development, user interface, communications programming, and computer and communications hardware. The following functions have been identified for the Information Services organization:

- Telecom maintenance and support;
- EMS database, display, and system maintenance;
- Metering and data acquisition;
- Operational information support;
- LAN/WAN support;
- Cyber security;
- Accounting and billing applications development, maintenance and support;
- Desktop applications development, maintenance and support;
- Business applications support.

Provision of continuous service and responsive support to the business and operational processes will be the CIO's most critical task.

3.2.6 Client Services Department (19 FTEs)

The Client Services department will be responsible for handling issues related to internal as well as external customer contacts. The following tasks have been identified for this functional area:

- Administer and register transmission customer applications for RTO West services;
- Negotiate and administer transmission contracts;
- Prepare procedural manuals for transmission customers;
- Conduct transmission customer training;
- Coordinate customer visits and meetings;
- Coordinate transmission customer dispute resolution;
- Administer transmission tariff;
- Coordinate external communications;
- Coordinate internal corporate communications.

Client Services staff will also be responsible for timely posting of information on the RTO website which is expected to be the primary method of disseminating information from the Board, Board Advisory Committee and its Subcommittees.

3.2.7 Human Resources Department (5 FTEs)

The Human Resources department will be responsible for providing human resource services to RTO West. The following tasks have been identified for this area:

- Employee selection and staffing support;
- Applicant tracking;
- Employee orientation and training support;
- Compensation and benefit program administration;
- Employee records maintenance;
- Employee safety issues.

3.2.8 Market Monitoring Unit (4 FTEs)

The Market Monitoring Unit will be responsible for monitoring RTO markets and if it detects market performance that is inconsistent with a competitive market, will investigate and determine the cause of the anomalous market performance. The following functions have been identified for the Market Monitoring Unit:

- Collect and disseminate market data;
- Evaluate market data to identify anomalous market performance;
- Work with market participants to resolve conduct issues;
- Recommend measures to correct market design flaws and improve efficiencies;
- Report issues to RTO Board and FERC related to anomalous market performance.

3.3 Backup Center Staff

For planning purposes, we have assumed that the RTO West backup center will be staffed on a 24X7 basis and that backup center staff will be responsible for performance of some of the RTO West functions as well as maintaining the functional availability of the backup center. The backup center staff would need to be augmented by personnel from the primary center in order to maintain full uninterrupted operation of RTO West if the primary center were disabled.

The actual division of employees between the primary and backup centers will ultimately depend upon future management decisions regarding the logical locations of and relationships between the various departments.

[At the California ISO, a portion of the operations staff responsible for regional operations in Southern California is located in their backup center. The California backup center is also responsible for scheduling interties between the California ISO and the Desert Southwest.]

We have estimated a staff of approximately 18 employees would be located in the backup center, including one supervisor. (These 18 FTEs are included in the 236 FTE total.)

3.4 Comparison of Staffing Levels at ISOs

The Numbers below are based on information gathered through informal discussions with the MISO, ERCOT, and KEMA Consulting. The actual organizational structure at each ISO may differ from the table. Preliminary staffing estimates for RTO West as shown in the second column were developed independently of staffing comparisons with other ISOs.

Current Transmission Planning Work Group recommendations provide for an expansion of the planning staff by 50 FTE over a two-year period (25 FTE per second and third year), for a total of 286 FTE. The other ISOs have much smaller planning staffs.

Structure	RTO West Preliminary	Current MISO Target	ERCOT Target (Note 1)	New England ISO	New York ISO Target	PJM	California ISO
Total Staff (Including Shift Staff)	236	250	200	228	278	333	305
<i>Note 1: ERCOT ISO created by PUCT is not FERC jurisdictional.</i>							

3.5 RTO West Labor Budget Estimate

In order to develop a labor budget for RTO West, we assumed an average salary of \$100,000/FTE, and included a 35% loading factor. In addition, we included preliminary budget estimates for travel and miscellaneous business expenses, Board of Trustees compensation, outsourcing, insurance premiums, self-insured retention and membership dues. The individual elements of the fully staffed RTO West labor budget are outlined below:

- 236 FTE x \$100,000 plus 35% loading = \$31.9 million
- Travel and misc. business expenses = FTE x \$500 per month = \$1.4 million
- Independent Board compensation and travel = approximately \$250,000
- Outsourcing (continuing needs)

Market monitoring	\$250,000
Reprographics	\$300,000
Outside Counsel	\$150,000
HR Consulting	\$100,000
Auditing	\$500,000
Total	\$1.3 million

Other costs:

- Insurance Premiums \$2.3 million annually
- Self Insured Retention \$1.0 million (funded at startup)
- WSCC Membership Dues \$1 million

Total staff count: 236

Contract work: \$1,050,000

Independent Board

President
Chief Executive Officer
(3)

Execution of Corporate Strategy
Administrative Support for CEO
Administrative Support for Board

Market Monitoring Unit
(4) FTE plus \$250,000 outside consulting
(Reports to RTO West Board)

Economic Analysis
Statistical Modeling
Market Analysis

Vice President
Chief Operating Officer
(117)

Vice President
Chief Financial Officer
Corporate Treasurer
(37) + \$550,000

Vice President
General Counsel
Corporate Secretary
(5) + \$150,000

Vice President
Chief Information Officer
(46)

System Planning
Operations Engineering
Archive Analysis
Compliance Monitoring & Reporting
Real time Security Analysis
Outage Coordination
Transmission Switching
Congestion Management
Ancillary Services
AGC/OTC & RAS Coordination
Scheduling - Transmission
OASIS Administration
Scheduling - Day Ahead Ancillary Services
Backup Operations Center
Security Coordination

Accounts Receivable/Payable
Purchasing & Inventory
Payroll
Billing & Settlement
Financial Analysis & Reporting
Internal Audit
Risk Management
Controller
Facilities Management

Regulatory Affairs
Legislative Affairs
Contractual Matters

Analysis, Design & Integration
Infrastructure
Desktop Applications
Web Support
Cyber Security
Telecom
EMS
Metering & Data Acquisition

Director of Client Services
(19)

Director of Human Resources
(5) + \$100,000

Client Relations
Registration
Customer Training
Contract & Tariff Administration
Internal Communications
Media Relations

Staffing
Compensation
Benefits
Training Support
Health & Safety

4. Technology and Data Requirements - Systems, Applications, and Communications

4.1 Scope

This category captures hardware and software systems needed by the RTO. Estimates include all costs for the RTO except:

- The building shell with its primary HVAC and building infrastructure;
- Cost of staff personnel;
- Cost of financing.

In addition to systems that support the transmission commercial business, these costs include computer hardware and software to support personnel and financial systems and most costs to adapt the building for RTO needs.

4.2 Assumptions

- Estimates assume that any site that meets requirements could be used as long as redundant and independent power and communications can be provided. System costs should be nearly identical in any qualified site, with the exception of the costs and equipment for providing power and external communications infrastructure to a specific site.
- All switching under the authority of the RTO will be accomplished by the transmission operators. The RTO will have no capability to control breakers, switches or taps. However, the RTO will directly control the operational parameters of major Remedial Action Schemes (RAS).
- Automatic Generation Control including all associated products will be accomplished by the RTO either by direct electronic communications with plants or by signals to controllers which will, in turn, be allocated to specific plants (usually by congestion zone) by that controller.
- The RTO will not own or maintain transmission equipment or supporting equipment such as utility communications systems, Remedial Action Schemes, etc. The RTO may lease use of existing utility communications systems.
- Costs are for the primary site and for the back-up site and show both start up and ongoing O&M costs for each. It is expected that systems will be procured that include licenses and provisions for both sites, thus the additional costs for implementing the system at the backup site should often be significantly less.
- Estimates assume that the backup site will have all critical near-term systems operating and ready to take over functions from the primary site and that the center will be staffed at appropriate levels seven days a week, 24 hours a day to be able to take over critical functions.

- It is expected that all critical systems and software will be duplicated at each site with identical data. This will include all near-term systems such as the OASIS/scheduling/tagging systems, EMS systems (substation data and automatic generation control), etc. It is not assumed that updates to identical data at each site will be instant or simultaneous.
- Congestion Management and Ancillary Services requirements for the various systems are not completed. The cost estimates of implementing these requirements assume reasonably expected implementation costs (mid-range) based on vendor experience to date.
- The estimates are intended to show the probable cost and are weighted neither high nor low. It is assumed that the most cost-effective solution will be for the RTO to take over some existing systems with appropriate reimbursement of development costs.

4.3 Expected outcomes

- Each site will be able to support all critical near term functions.
- Systems will accommodate seamless workflow (data that is used in various, different systems will automatically move through those systems with reliable outcomes and minimum manual interaction).
- Databases will be integrated to the maximum extent possible to be used by multiple systems.
- Commercially available, open systems will be used to maximum extent possible.

4.4 Important comments

- Communications are exceptionally important to the RTO systems and require substantial planning to assure full requirements are met at a viable price. Depending on the assumptions used, cost can be *very* high as was the case in establishing the California ISO.
- Discussions with vendors indicate that the critical path for completion will likely be the flow distributed scheduling systems for the transmission commercial business (OASIS through settlement and billing). They indicate that it is possible for these systems to be in place 12-14 months from the time a contract is in place. A minimum of 2-3 months will be required to get a contract in place. Therefore, work must begin immediately if we are to have the comprehensive system envisioned by Congestion Management Work Group participants at any time near the December 2001 date. An alternate proposal from the Congestion Management Work Group to delay implementation of flow distributed scheduling for an interim period of one year would seem prudent. In any event, work on scheduling systems must begin forthwith.
- There are substantial control issues connected with AGC. Clear performance and reliability standards will be required of generators under AGC control. Contracts with generators must be specific enough to result in responsiveness to AGC (where appropriate).

4.5 Cost matrix

Estimates as of August 24, 2000.

Templates are available for each listed system for information on estimates

BOLD/SHADING means system is likely required for start up

If unknown, default O&M estimate is 15% of startup.

Item #	SYSTEM	COST K\$	O&M K\$	Backup Center K\$	Backup O&M K\$
1	RTO Web Site (OASIS phase 2+)	\$1,800	270	\$600	90
2	Scheduling/E-Tags	Incl. in 1		Incl. in 1	
3	Congestion Management	\$1,275	191	\$425	64
4	Settlement/Billing	\$8,000	1,200		0
7	Ancillary Services	Incl. in 3		Incl. in 3	
Total of 1-4, 7 w/o O&M: \$12,100k					
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5	Metering System (data management)	\$1,500	225		0
6	Load Forecasting & Meteorology	145	20	\$12	1
8	Outage Coordination	\$60	20	\$0	0
9	Security Coordinator Systems	\$100	15		0
10	Communications – Operations Voice	\$1,310	50	\$1,310	50
11	Communications – External Utility	\$1,400	1,098	\$498	810
12	Backup Power Supply (UPS) & Generator	\$1,680	20	\$1,330	20
13	Operations Networks & Cyber Security	\$750	113	\$750	113
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15	AGC	\$3,000	100	\$1,000	0
16	SCADA	\$4,500	120	\$1,500	100
17	Mapboard/Display	\$1,000	10	\$500	5
18	Consoles – Dispatch/Scheduling	\$256		\$181	
21	Dispatch Real Time Electronic Communications	\$1,000	150	\$100	15
22	WSCC Net Messaging System	\$30	5	\$30	5
23	Electronic Dispatch Logs	\$750	75	\$250	25
24	ICCP Communications including Network	\$659	20	\$238	9
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26	Off Line Power System Study Tools	\$200	60	\$0	0
27	Advanced Applics./On-line Powerflow Study Tools	\$300	85	\$0	0
28	RTO Business and Dispatch Training Simulator	\$1,850	50	\$0	0
29	Power System Monitor and Analysis	\$110	17	\$5	1
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30	Office Furniture	\$1,200	180	\$300	45
31	Communications – Corporate Voice Phones	\$135	34	240	24
32	RTO Information Technology	\$2,500	375	\$240	36
33	Support Systems (incl, payroll, financial) + Legal	\$2,000	200	\$0	0
34	Database Systems	\$570	47	\$0	0
35	Building Security, Fire Suppression, Bldg. Monitor	\$80	12	\$80	12
	Contingency	\$3,816	476	0	0
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TOTAL		41,976	5,238	9,589	\$1,425
Both Sites – GRAND TOTAL		\$51,565	\$6,663		

4.6 Cost summary

	Primary Cost \$K	O&M \$K	Backup Center \$K	B/U O&M \$K	
Scheduling and Marketing Systems	11,075	1,661	1,025	154	Includes #1-7, 35
DISPATCH and OPERATIONS Systems	20,600	2,253	7,704	1,154	Includes items #8-29
General Purpose and Support	6,485	848	860	117	Includes #30-36
Other /Contingency 10%	3,816	476			For primary site only
Total	41,976	5,238	9,589	1,425	

GRAND TOTAL (Primary + B/U) \$51,565 \$6,663

5. Control Center Facility Requirements

The Implementation Work Group was given direction from the RRG that the primary RTO site for consideration should be BPA's Dittmer Control Center. More recently, we were also allowed to consider "brownfield" (existing building) sites within the greater Portland/Vancouver area. After reviewing the transition plan for moving RTO staff and systems into BPA's Dittmer Control Center, the Implementation Work Group recommends that a "brownfield" site be developed as the primary RTO Control Center.

5.1 Primary Control Center

The cost to locate RTO West at Dittmer is comparable to the development of a "brownfield" site in the Vancouver/Portland area (leased office space). The "brownfield" building would require 75,000 sq. ft. while there is between 75,000 and 100,000 sq. ft. available at Dittmer for RTO West. For budgetary purposes, it is assumed that BPA would retain 25,000 sq. ft at Dittmer to house computer, communications infrastructure, and minimal staff.

The Implementation WG will identify and evaluate possible "brownfield" sites in the Portland/Vancouver area. Budgetary analysis for a "brownfield" site is based on current market rate lease costs of \$18.50 per sq. ft. Additionally, the WG will request that PGE submit a formal proposal for the use of the Trojan facility.

[PGE has offered their vacant Trojan facility as a possible location for the primary control center. Trojan meets the basic infrastructure requirements to serve as the control center including a computer room with raised flooring, sufficient office space, parking for 250-300 employees, UPS, redundant AC power supply, and hard line and microwave communications. Fiber optics must be added as well as a backup generator. 80,000 square feet is available at the Trojan facility at an estimated annual lease cost of \$8.00 per sq. ft. This cost does not include tenant improvements.

Trojan is located about one hour's drive north of the Portland/Vancouver area which reduces the facility's public exposure but will pose problems with respect to commuting from the urban core and travel to and from the Portland Airport.]

5.2 Dispatch and Staff

The primary dispatch and computer area will require 10,000 sq. ft. and at least 200 sq. ft per support staff employee (75,000 sq. ft. would accommodate up to 300 employees).

5.3 Backup Control Center

The backup center will operate as a "hot" backup with 24X7 dispatch coverage and perform a limited subset of RTO West functions. The facility will use a "brownfield" site remotely located from the primary and in a non-federal facility. The backup dispatch area will require 5,000 sq. ft. The backup center will require a total of 7,500-10,000 sq. ft. and will not exceed \$25 per sq. ft. including tenant improvements and full service.

5.4 Redundant Systems

Both centers will use redundant systems for building HVAC and AC electrical. Both will be equipped with UPS exceeding 30 minutes and backup generator(s) for UPS and remaining electrical needs.

5.5 Estimates (all values in \$1000)

	Dittmer	Brownfield	Trojan	Backup
One time improvement	\$3,375	\$3,735	\$2,500	\$1,240
Annual Lease, Maintenance, Utilities	\$1,280	\$1,633	\$915	\$275
Total first year cost	\$4,655	\$5,368	\$3,415	\$1,415

5.6 Site Selection: Considerations Other Than Cost

The cost of initial implementation is dominated by the technology costs, particularly applications. Initial facilities costs represent less than 10% of the technology costs. The annual operations cost is dominated by the staffing costs with facilities representing less than 6% of the staffing costs. Since the costs of facilities are not dominant, the costs for different primary alternatives are relatively close, and the costs for different back-up alternatives are relatively close, then the selection of sites should be based less on cost and more on other criteria, such as availability of capable staff, timely implementation and consistency with the goals of the RTO.

Use of the Dittmer site for evaluation purposes has served to help us develop cost estimates for the various systems. It has also stimulated us to think about how the transition might take place. After reflecting on this, we noted the following difficulties in starting up the RTO at Dittmer. The following attempts to avoid "cost-centric" issues.

5.6.1 System Security Assistance

For some time, BPA has provided an RTO-like backstop with respect to electric system security activities in the Northwest (i.e. BPA staff, skilled and experienced in operating an extensive transmission system and dispatching and redispatching the substantial generating resources of the Federal system, have stepped in to resolve conditions threatening regional reliability).

- If we encounter difficulties midway through a startup at Dittmer and the nascent RTO does not yet have the capability to resolve the problem, we will not be able to rely upon the (newly disrupted) BPA organization to intervene.
- If the RTO is developed at a separate site, BPA would not be required to undergo such extensive changes. Its full capability would likely be available for regional assistance.

5.6.2 Timely Transition

Participants desire to accomplish the transition in the shortest practicable time period, considering FERC's proposed timetable (and considering that a lengthy period of parallel operation during the transition will be costly to participants).

- Starting up the RTO in a facility occupied by another entity (in the case at hand, BPA – but it would be the same at the facility of any other entity) puts decisions and support systems of the host entity on the critical path for every startup action. This has the potential to result in a diverse array of inefficiencies. The RTO staff could not be moved into the facility until host staff was moved out (which in turn depends upon the host's personnel procedures). RTO facility changes, such as ordering new telephone lines or other services, moving furniture or connecting to host electronic facilities, depend upon host procedures and are complicated by ownership and operational responsibility issues.
- If the RTO is developed at a separate site, RTO startup staff would be able to act effectively and efficiently, unencumbered by the unrelated needs of other organizations.

5.6.3 RTO Goals

The participants' desire to create an RTO with goals similar to those espoused in the mission statement of the proposed ITC:

“...dedicated to exercising initiative, innovation, and market-driven management to deliver highly reliable and efficient transmission services...recruit, develop, motivate, reward and retain personnel of exceptional ability, character, and dedication”.

- If the startup occurs in a climate wherein staff must adopt not the optimal solution, but the solution that works within the host organization, we may discourage initiative and innovation and establish a de facto standard of accepting the status quo. Eager new hires may quickly become frustrated and discouraged. During the first few months, the RTO will be competing in a tight market for capable staff and will be expending considerable time and money attracting them. We can ill afford to lose a single employee. We certainly do not want to develop a reputation for permitting inefficiency or for not creating a climate of excellence.
- If the startup occurs at a separate site, all personnel and processes at the site will be under RTO control. New hires will be limited only by the ability of their leadership to empower their activities (i.e. time, budget and authority).

Any one of the obstacles or conditions described above could certainly be overcome. However, the combined effect of these considerations is to create a good deal of question regarding the advisability of forming the RTO at a site presently used by another operating entity.

In summary, startup at Dittmer may be more time-consuming, less efficient and less conducive to establishing the intended RTO ethos than startup at another site in the area. The Implementation Work Group recommends using a “brownfield” site, or consideration of the Trojan facility.

6. Implementation Plan

6.1 Some Beginning Transition Activities

- a) Acting CEO/CFO (person with authority to commit funds) appointed;
- b) RTO Facility Program Manager appointed;
- c) RTO facility built/leased;
- d) Utilities connected, including temporary telephone; cell phone okay (before leasing facility, make sure cell phones work throughout the site);
- e) Physical security services contracted;
- f) Temporary furniture for initial staff installed;
- g) Initial business computer equipment with internet/email access via DSL or cable modem installed;
- h) T1 line(s) installed;
- i) Begin installation of business LAN;
- j) Begin installation of operational network;
- k) Begin installation of fiber and microwave;
- l) When Security Tools are operational, move in Security Coordinators and begin 24x7 operation;
- m) As key personnel become available, move them in;
- n) Key personnel develop draft policies and procedures, facilitate recruitment, and orientation of staff, etc.

6.2 RTO West Implementation Staff

The RTO West Implementation staff would include those responsible for major implementation activities during startup. The following tasks have been identified for this functional area:

- Administer RTO West implementation;
- Work closely with transmission owners/control areas to define requirements, interfaces, and data models;
- Define processes and procedures;
- Review and approve specifications for the communications and control systems infrastructure;
- Enter into contracts for the communications and control systems infrastructure;
- Enter into contracts for RTO West primary and backup facility construction/remodel activities;
- Participate in factory and field acceptance testing;
- Conduct field trials in preparation for RTO West commissioning.

6.2.1 Human Resource Consulting

Human resources development will play a key role during startup. It is anticipated that outside HR consulting may be used to assist RTO West HR personnel in the following:

- Executive search;
- Relocation;
- Performance incentive program;
- Job development;
- Performance measurement system development;
- Human resource policies and procedures;
- New employee training.

Human Resources may also incur additional costs during transition and startup for administrative support, travel and incentive compensation.

6.2.2 Other Staffing Requirements

Consultants and/or contractors may be required to provide specialized knowledge or expertise to assist the RTO West staff during project implementation. Consultants and/or contractors may be required to:

- Provide project management;
- Prepare process diagrams;
- Prepare procedure manuals;
- Prepare and conduct training programs for RTO West employees and/or transmission customers;
- Prepare databases;
- Provide IT support;
- Perform administrative functions.

6.2.3 Transition Team Composition and Costs

With the goal of startup by December 2001 (or as soon thereafter as practicable), the implementation work group believes that certain activities must proceed in parallel. Our favored approach would be to select a group of people to begin certain implementation efforts as soon as possible. This transition group should consist of personnel who have the attributes that the filing utilities desire in the RTO West staff. They would not be promised a job in the RTO West. However, with the characteristics that cause them to be selected for the Transition Team, we expect that they would be able to compete favorably for a position when permanent employees are hired.

Certain work associated with establishing a corporate body and supporting infrastructure (regardless of its purpose) must be accomplished before the organization can begin to function. The Transition Team must begin these activities plus early action on those RTO specific activities which the filing utilities require to be in place when the RTO begins operation.

In any case, no meaningful work will be accomplished until sufficient funds have been set aside and an acting CEO/CFO can be selected by the filing utilities. Without funds and an individual empowered to make decisions and obligate the funds, no progress will occur. Although it is possible to determine how long the transition process may take, actions will not be effective until

a single person responsible for the success of the transition and authorized to make decisions and expend funds has been appointed.

The Transition Team might consist of 30 people working on implementation for a period of 12 months. Personnel costs for such a group could be estimated as 30 (FTE) times \$90,000 plus 35% loading or approximately \$3.65 million. Travel and miscellaneous costs at \$1,000 per month per FTE would add an additional \$260,000 for a total of \$4.0 million in Transition Team start up costs. Funding for longer or shorter periods would vary accordingly.

6.2.4 First-Year Employee Costs – “Staffing Up”

During the first startup year, the RTO West will be hiring and “staffing up”. While it is difficult to estimate how many employees will be hired over time during the first year, costs for staff and staff travel are estimated to be less than the fully staffed estimates of \$33 million.

If the RTO begins its first year with zero employees and hires them uniformly over the year until it ends the year with its full complement of 236 FTE, it will have averaged one half of the authorized number. Therefore we might expect first year costs for permanent employees to be about one half of the ongoing costs. We expect to incur high travel, relocation and incentive expenses during the startup period.

If we recruit adequate numbers of personnel to ensure a successful startup, we will probably spend at least half of our projected ongoing personnel budget, or more than \$17 million.

During startup, RTO West is expected to incur costs for an “executive search” firm to hire the CEO, and to find suitable individuals for selection to the Board of Trustees. Based on anecdotal input from other ISOs, the costs could be in the \$500,000-700,000 range.

6.2.5 Staffing and Organizational Transition

Many critical human resource issues will need to be addressed in order to achieve a smooth transition to initial operation of RTO West. The success of transition to RTO West operation will depend upon a well-organized strategy and process for dealing with people issues. In order to complete the transition, RTO West will need to do the following:

- Establish the RTO West mission, vision, and values;
- Secure an HR consulting firm to assist with organizational design;
- Develop role requirements for officer positions in order to establish a compensation strategy addressing issues such as base pay, relocation, short-term incentives, and severance;
- Establish a plan to bridge benefits for initial RTO West staff;
- Recruit a CEO and remaining officers;
- Identify key leadership competencies that will be required in the new organization, and assess potential leaders against those behaviors;
- Identify key transitional roles, and project managers who can quickly and successfully assume those roles once the start-up begins;
- Develop a job scope for each position in the organization, a compensation structure, and a benefits plan;

- Establish a performance measurement system that institutionalizes the organization's culture, and reward individuals for their value-added contributions;
- Establish a long-term incentive program for officers that rewards individual contributions and serves as a vehicle for retention.

RTO West staff will need to be trained in RTO West policies, procedures, computer equipment and applications before RTO West begins operation. The amount of training that will be required will depend upon the experience levels of the employees that are hired.

Transmission customers will also require training on a broad range of topics including:

- Power system operations;
- Transmission pricing;
- Congestion management policies and procedures;
- Billing and settlement systems and procedures.

This training could be accomplished through instructor-led training programs or through training materials made available on an RTO West web site.

7. Key Recommendations

7.1 Transition Team & Funding

The Implementation Work Group recommends that a Transition Team be constituted as soon as practicable, that funds be appropriated and that a lead individual with authority to obligate the funds be appointed.

7.2 Site Selection

The Implementation Work Group recommends that the Transition Team be directed to select a brown field site (or green field site, if costs are comparable and the facility can be constructed in an appropriate time frame) in the Vancouver, Washington area. Sites located elsewhere in the greater Portland, Oregon metropolitan area may be more cost-effective, but may lack the attractiveness of Washington personal income tax laws. Critical discriminators are proximity to the Portland International Airport and likely commute distance. During the startup period (1 to 2 years) we will want to maximize staff performance, both in quality and quantity. Long commutes reduce the amount of time available on the job and increase both accident exposure and stress.

7.3 Other Priority Tasks

The Implementation Work Group recommends that the Transition Team be directed to begin work immediately on the following tasks:

- Establishment of RTO West internal infrastructure
- Control area issues (AGC, ACE, etc.)

- Transmission grid management and Security (RAS, Switching Authority, Reliability, Outage Scheduling)
- Other processes as soon as policy decisions are made and work can begin

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