



Grid West

Grid West Cost Discussion

Draft for Discussion with TSLG – July 20, 2005

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Today's meeting will cover the following topics...

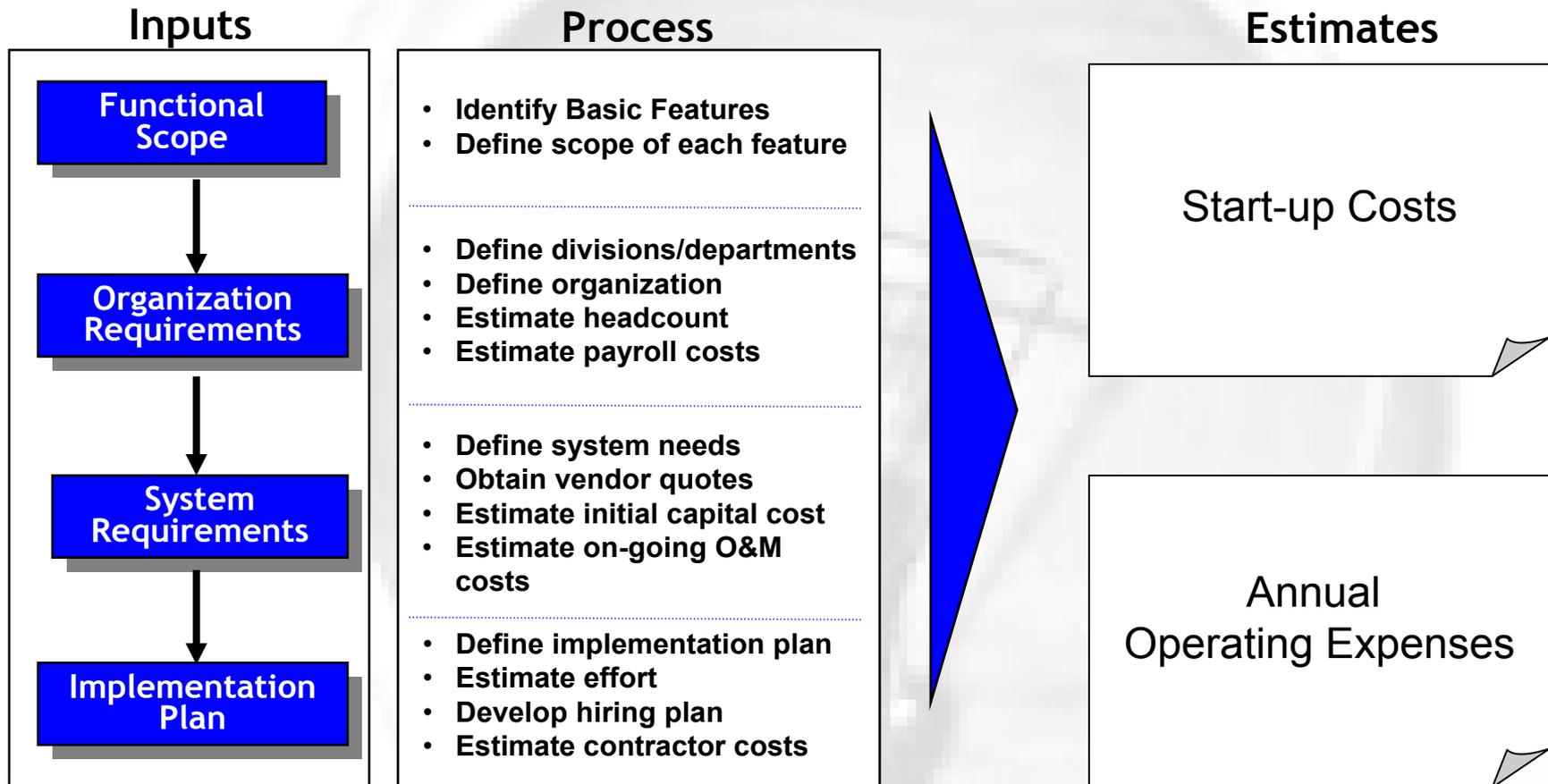
- Background
- The Numbers
- Operating Expenses
- Startup Capital Costs
- Avoiding Costs

To develop a bottom-up cost estimate for the start-up capital costs and annual operating expenses associated with the proposed Grid West Basic Features...

In developing a cost estimate the following should be kept in mind...

- **Top-down estimates are different from bottom-up estimates**
 - Top-down estimates can be calculated quickly but tend to be less precise
 - Bottom-up estimates are typically more accurate
 - This cost estimate is a bottom-up cost estimate
- **Bottom-up cost estimates takes time**
 - Typical bottom up takes 8-12 weeks, based on a well defined market
- **Bottom-up cost estimates require a firm understanding of the functional scope (e.g., market design)**
 - What functions will Grid West perform?
 - What is the scope of each function?
 - How many employees will be required?
 - What systems will be required?

To develop the cost estimate we used the following approach...



Background Functional Scope – Layer 1

Background

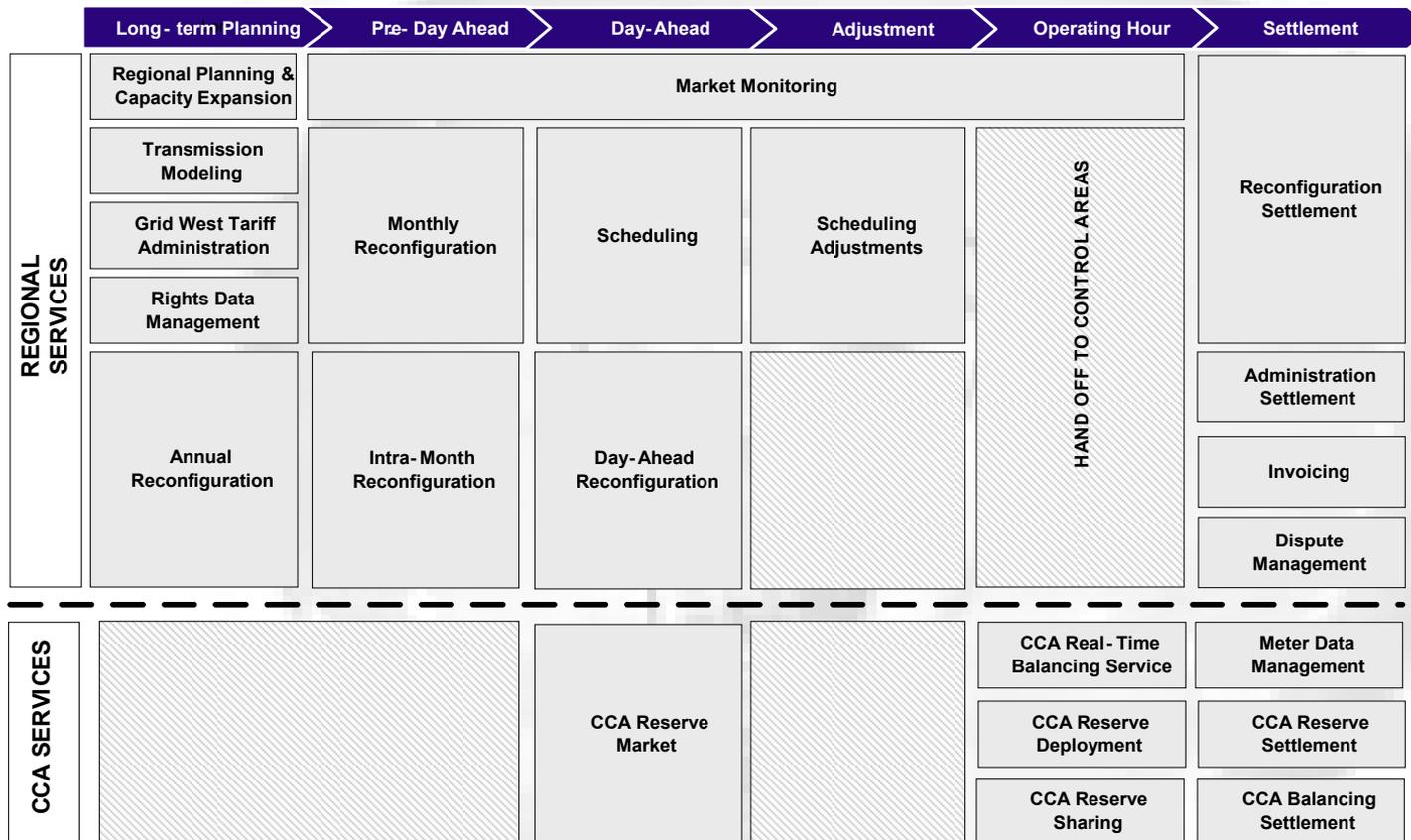
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

As a part of the conceptual design effort, the following Grid West services have been identified...



Background

Functional Scope – Layer 2

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

White Paper Overview: Grid West Market & Operational Design

White Papers

Module 1 Transmission Service

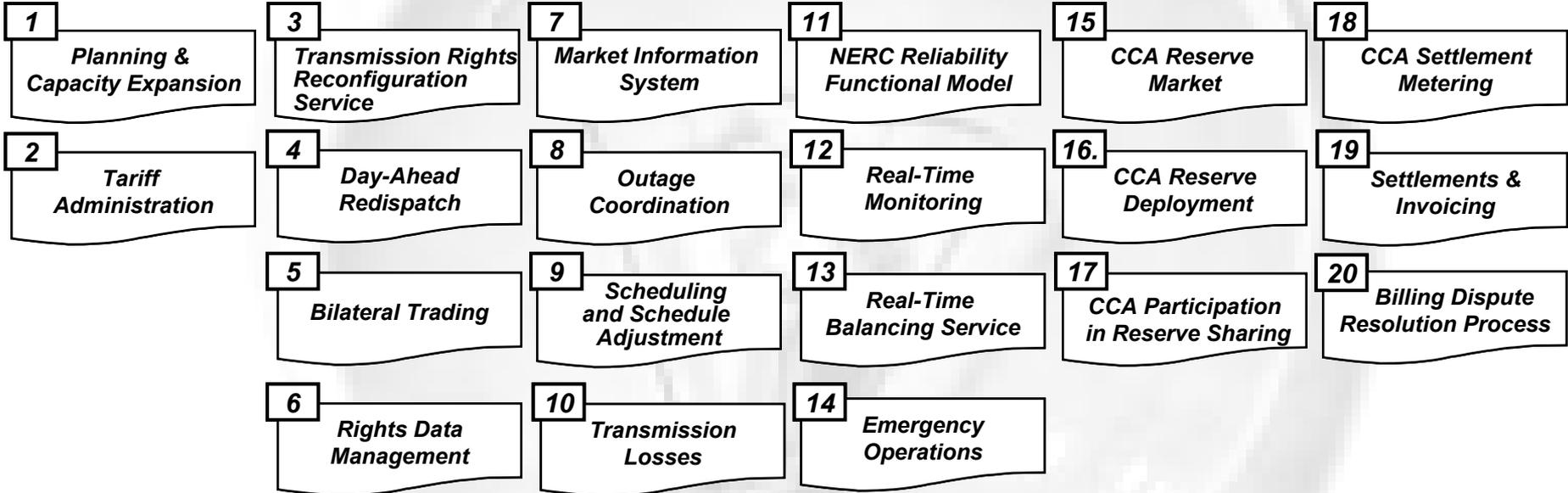
Module 2 Rights Administration

Module 3a Scheduling

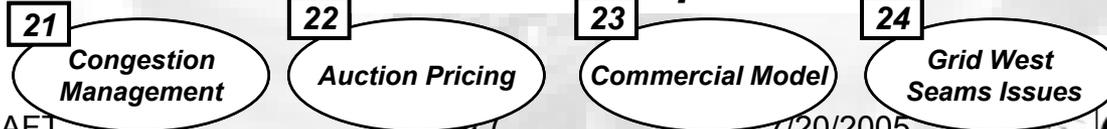
Module 3b Operations

Module 4 Ancillary Services

Module 3c Settlement



Reference Papers



DRAFT

1/20/2005



Grid West

Background SMD Comparison

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

SMD Style RTO Features

- Generation resource adequacy standard imposed:
- Centralized unit commitment.
- Day-ahead energy market:
- Centralized scheduling without a balanced schedule requirement (may be short).
 - Transmission rights not needed to schedule
 - Conversion of pre-existing transmission rights.
 - Explicit day-ahead congestion cost charges .
 - Obligation type FTRs.
 - Only annual and monthly FTRs auctions.
- Full marginal losses charged ex-post.
- No post-day ahead schedule changes
- Real-time energy market, with all deviations between day-ahead and real-time settled.
- Market monitoring.

Grid West Basic Features*

- No generation resource adequacy standard imposed:
- No centralized unit commitment.
- No Day-ahead energy market
- Centralized scheduling with balanced schedule requirement.
 - Must have physical transmission rights to schedule.
 - Existing transmission rights are unchanged.
 - No explicit congestion charges.
 - New rights issued as physical IWRs.
 - Reconfiguration Service with annual, monthly, intra-monthly, and day-ahead auctions.
- Ex-ante losses for IWRs and pre-existing rights.
- Post-day ahead adjustments
- Real-time market for balancing service and only within control areas that voluntarily consolidate.
- Market monitoring.

* **Note: Grid West changes from today underlined.**

The Numbers

The Numbers

Key Assumptions

Background

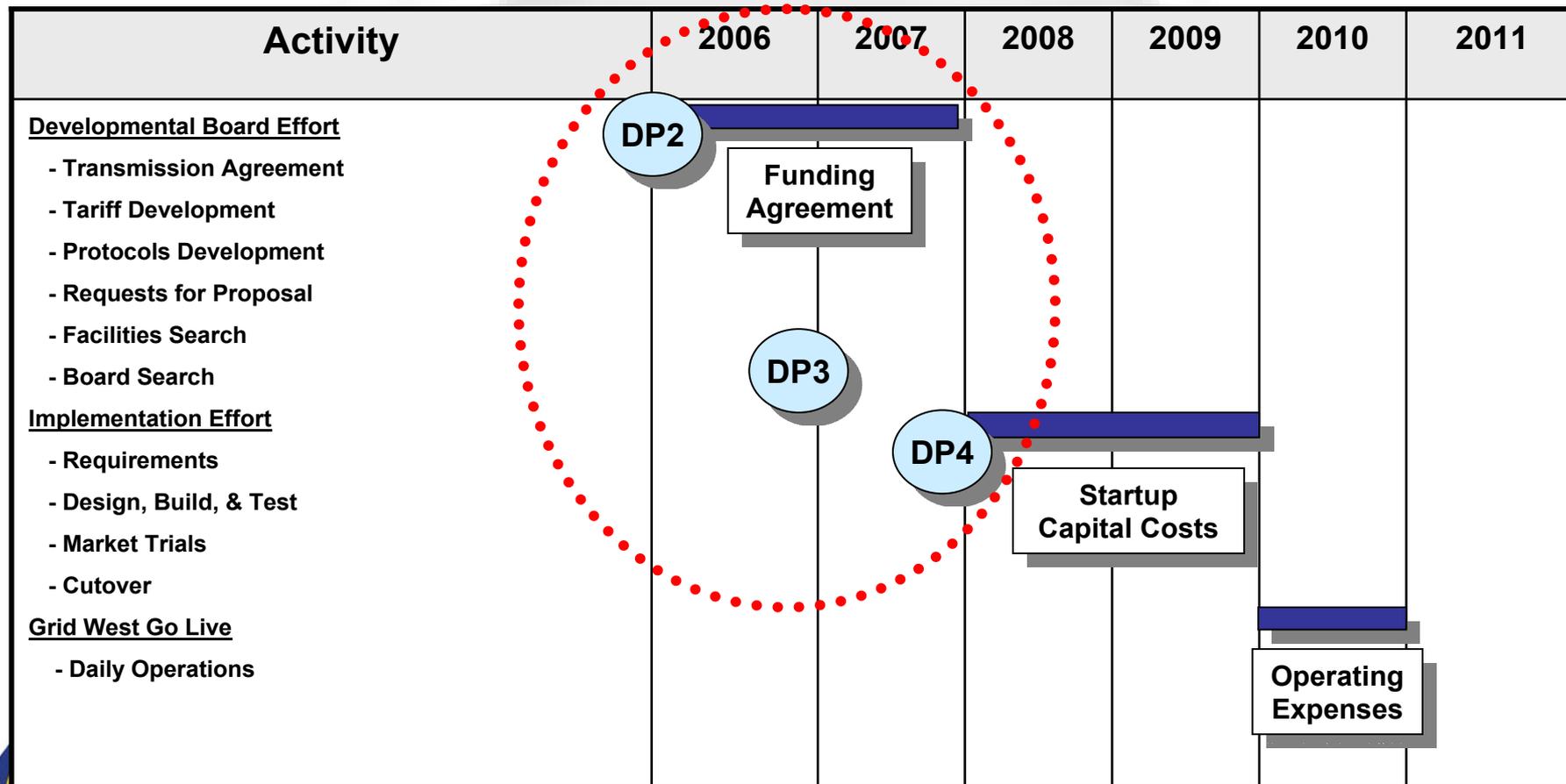
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

The scope of our work did not include estimates for activities taking place prior to Decision Point 4...



The Numbers

Interim Funding Activities

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Prior to Decision Point 4, it is assumed the following has been completed...

- Contractual arrangements (e.g., TA, etc.)
- Market design complete and approved
- Requests for proposal (RFPs)
- Financing
- Organization design
- Facilities search
- Board search and seating

The following are descriptions of cost categories...

- **Start-up Capital Costs** – The costs associated with the implementation of Grid West Basic Features. It includes both capital expenditures (e.g., systems, hardware, etc.) and pre-operational expenses (e.g., labor, facility lease costs, etc.)
- **Annual Operating Expenses** – The annual costs associated with the operation of Grid West (e.g. labor, maintenance, etc.)
- **Revenue Requirement** – The annual costs associated with the operation of Grid West PLUS the amortization of start-up costs and interest payments. Our scope did not include the determination of a revenue requirement.

The Numbers

Start-up Capital Cost Overview

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Cost Category	Estimate	% of Total
Capital Expenditures		
- Systems	\$40,111,000	30%
- Outside Services	\$18,648,000	14%
- Data, Voice, Network	\$8,514,000	6%
- Facilities (Leasehold Improvements)	\$5,436,000	4%
Total	\$72,709,000	55%
Preoperational Expenses		
- Grid West Labor	\$32,392,000	25%
- Facilities	\$6,074,000	5%
- Hardware/Software Expenses	\$1,384,000	1%
- Employee Expenses	\$1,442,000	1%
- Insurance	\$1,500,000	1%
- Other	\$1,345,000	1%
Total	\$44,137,000	33%
Interest During Construction	\$15,836,000	12%
Total Startup	\$132,682,000	



The Numbers

Annual Operating Expense Overview

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Cost Category	Estimate	% of Total
Annual Operating Expenses		
- Grid West Labor & Benefits	\$38,626,000	54%
- System Expenses	\$5,232,000	7%
- Data ,Voice, & Network	\$2,967,000	4%
- Outside Services	\$4,186,000	6%
- Capital Enhancements	\$4,011,000	6%
- Facilities	\$3,569,000	5%
- Employee Expenses	\$2,135,000	3%
- Insurance	\$2,000,000	3%
- Other	\$2,838,000	3%
Operating Expense	\$65,564,000	

Representative Revenue Requirement Overview

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Cost Category	Estimate	% of Total
Revenue Requirement		
- Annual Operating Expense	\$65,564,000	77%
- Amortization of startup costs (over 10 years)	~ \$13,268,000	16%
- Interest on startup costs (5.5%)	~ \$6,574,000	7%
Revenue Requirement	\$85,406,000	
Annual Load (MWh)	291,000,000	
\$/MWh	\$0.29/MWh	

- FOR ILLUSTRATION PURPOSES ONLY -

The Numbers

Startup Cost Benchmarking

Background

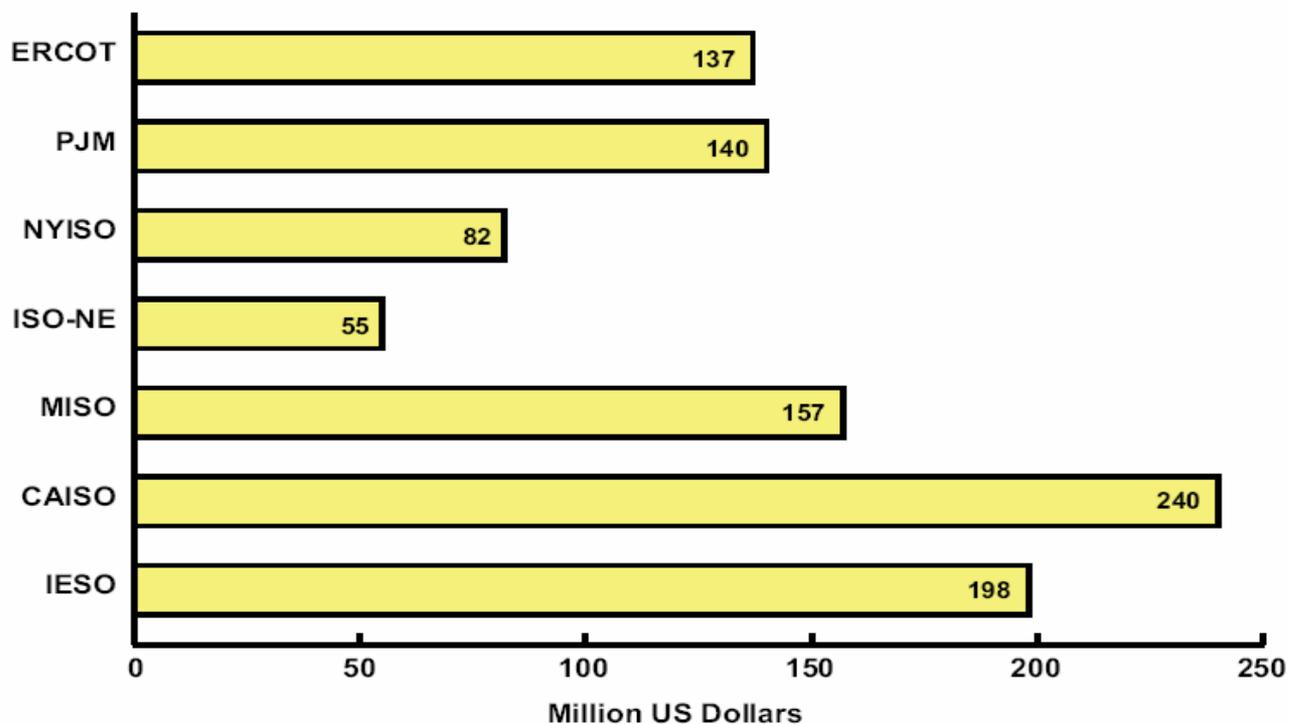
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Figure 6
Start-up Cost of RTO/ISO



Source: Cambridge Energy Research Associates.
50201-4



The Numbers

Operating Expense Benchmarking

Background

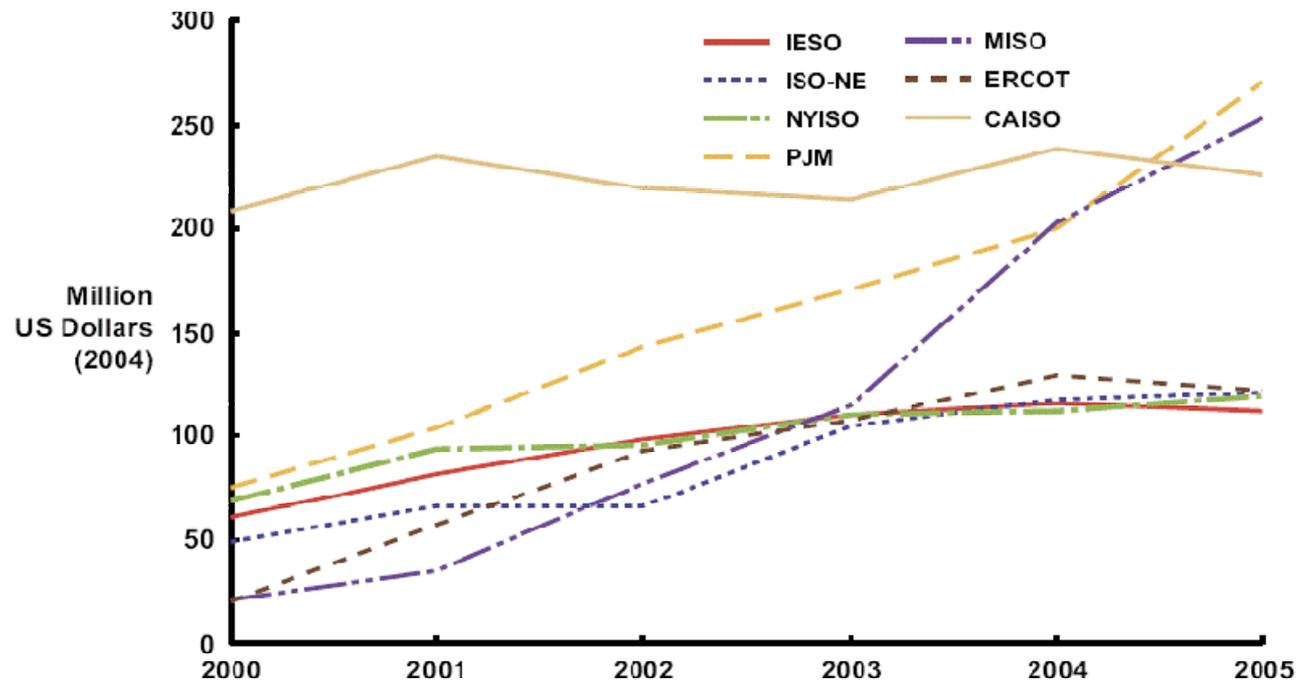
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Figure 8
Annual Operating Costs



Source: Cambridge Energy Research Associates.
50201-6

The Numbers

Operating Expense Benchmarking

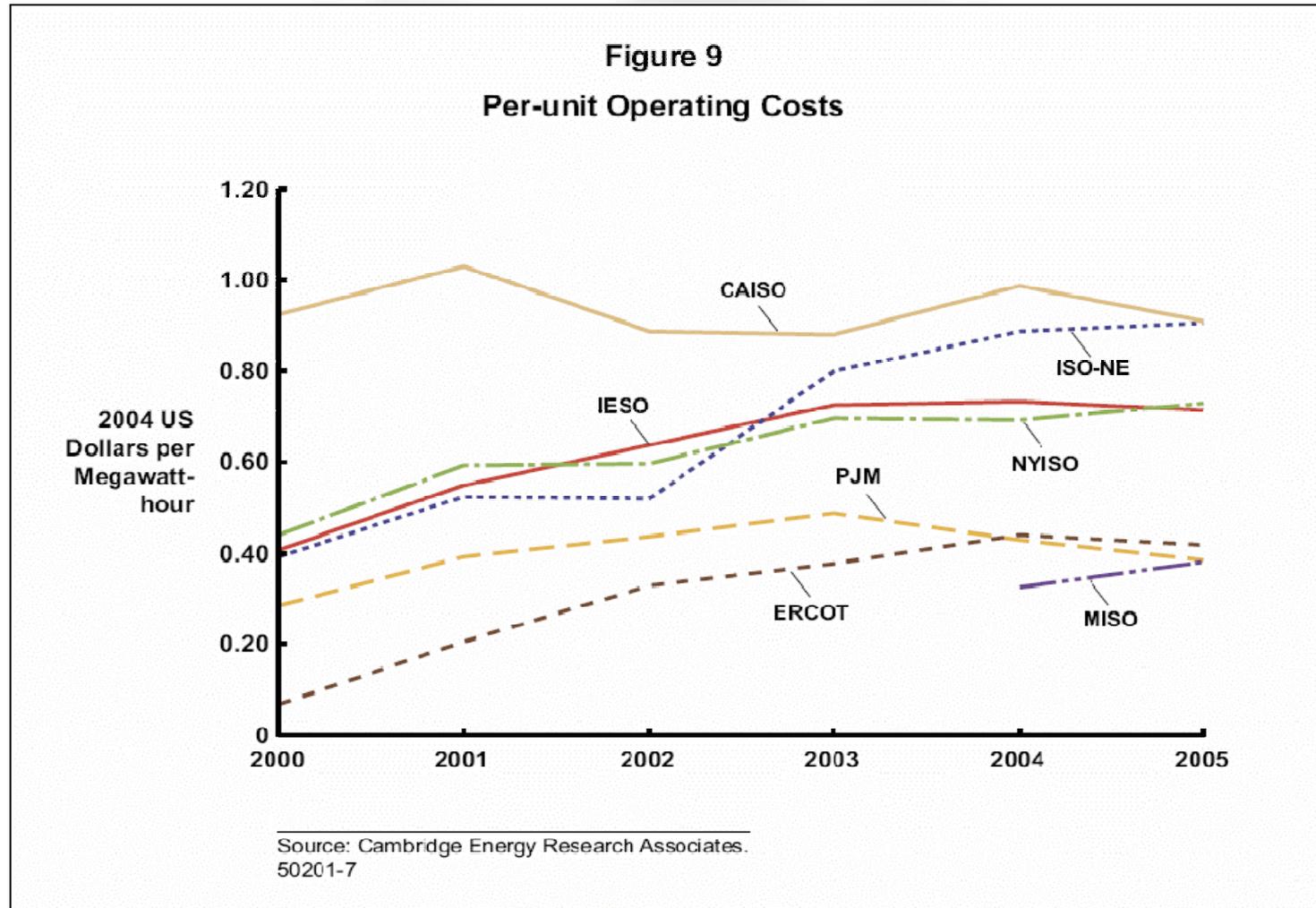
Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs



The Numbers

Operating Expense Benchmarking

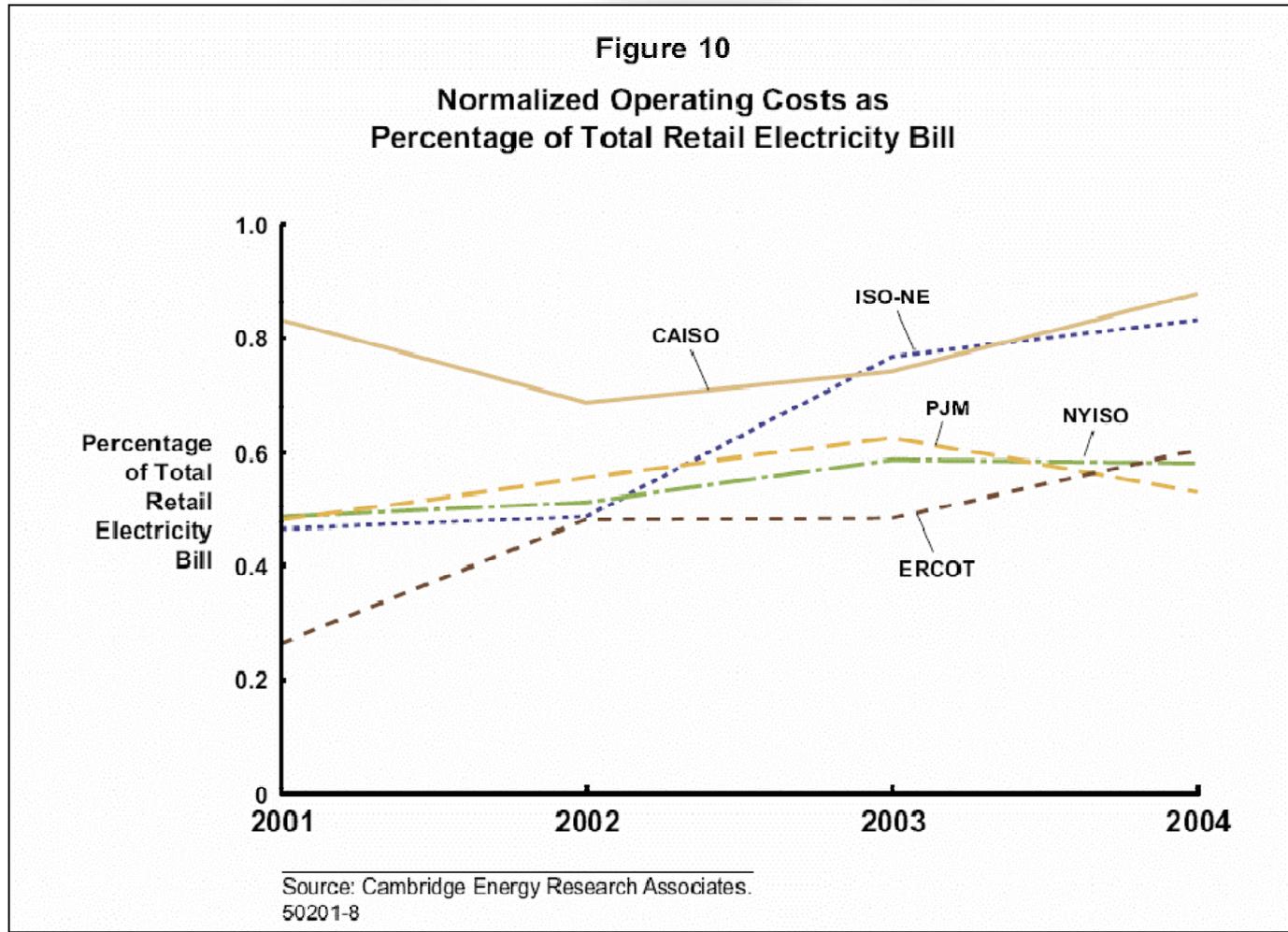
Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs



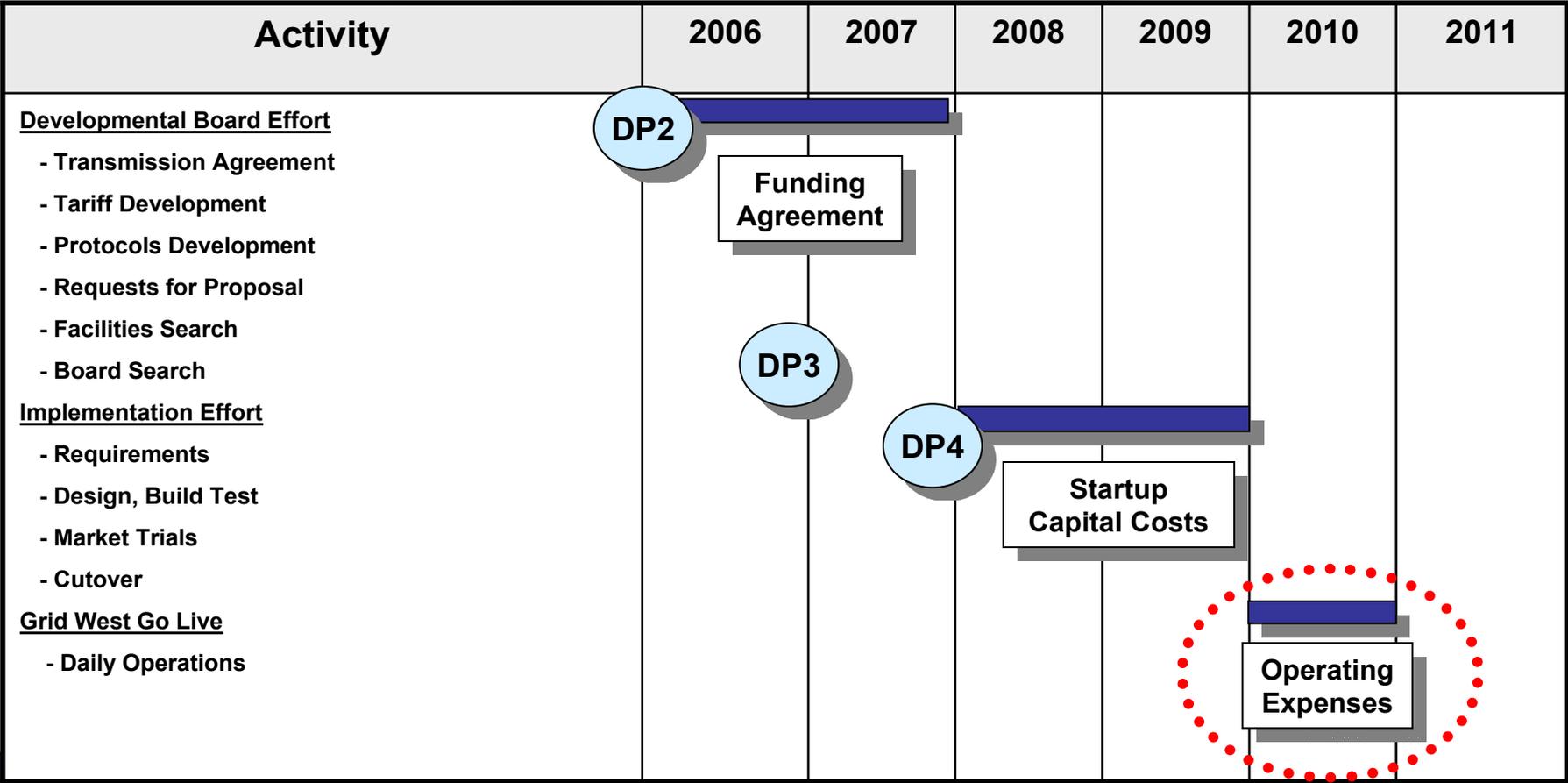
Annual Operating Expenses

Operating Expenses

Key Assumptions

Background	The Numbers	Operating Expenses	Startup Costs	Avoiding Costs
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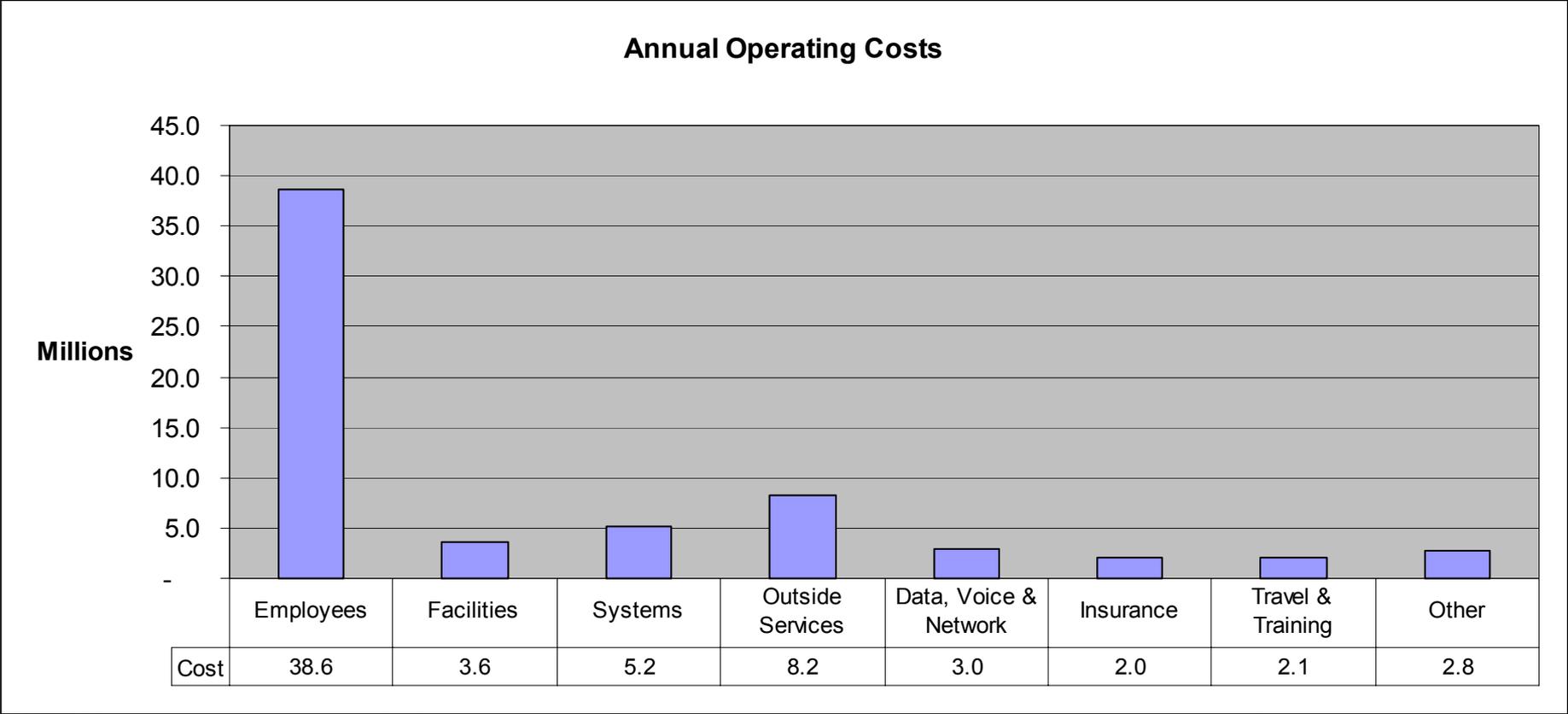
This section focuses on Grid West annual operating expenses...



Operating Expenses Overview

Background	The Numbers	Operating Expenses	Startup Costs	Avoiding Costs
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Based on our assumptions, we have estimated Grid West's annual operating expenses to be \$65 million...**



** Does not include interest and amortization of start-up costs



Operating Expenses

Key Components

Background	The Numbers	Operating Expenses	Startup Costs	Avoiding Costs
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The following are key components of operating expenses...

Cost Driver	Grid West	Avg. RTO
Employees	~ 54%	~ 45-55%
Outside Services	~ 13%	~ 20-25%
Systems	~ 8%	~ 7-10%
Facilities	~ 5%	~ 3-8%
Data, Voice, Network	~ 5%	~ 4%
Insurance	~ 3%	~ 2-6%
Training & Travel	~ 3%	~ 3%
Other	~ 9%	~ 4-8%

** Before depreciation/amortization*



We have used the following format to present our findings...

- Approach (Steps, Challenges, & Assumptions)
- Results
- Drill Down
- Benchmarking
- Contribution to Costs

Operating Expenses

Employees: Approach

Background

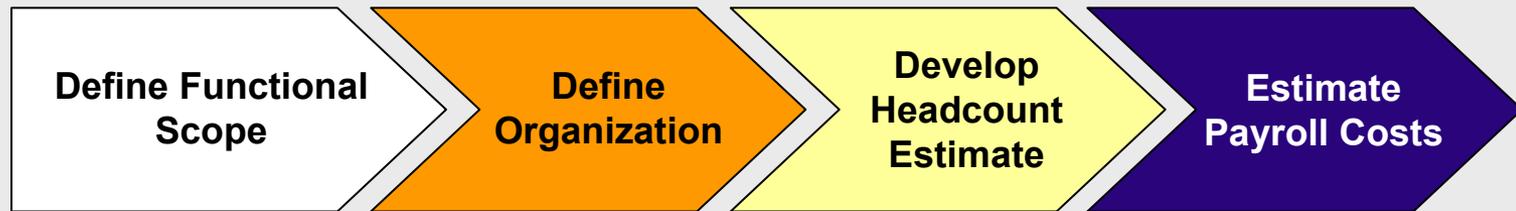
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Our Approach



Challenges

- Number of divisions/departments
- Number of “24x7” positions
- Staffing of “24x7” positions
- Compensation model
- Staffing of backup facility
- FTE workload
- Benefits loading
- Annual employee expenses (travel, training, etc.)

Assumptions

- Divisions: 6
- Departments: 24
- 24x7 positions: 9 desks
- Staff per 24x7 position: 6
- Salary: Tiered structure
- Backup: Staffed
- FTEs: 305
- Benefits loading: 30%
- Employee expenses: \$7,000/FTE



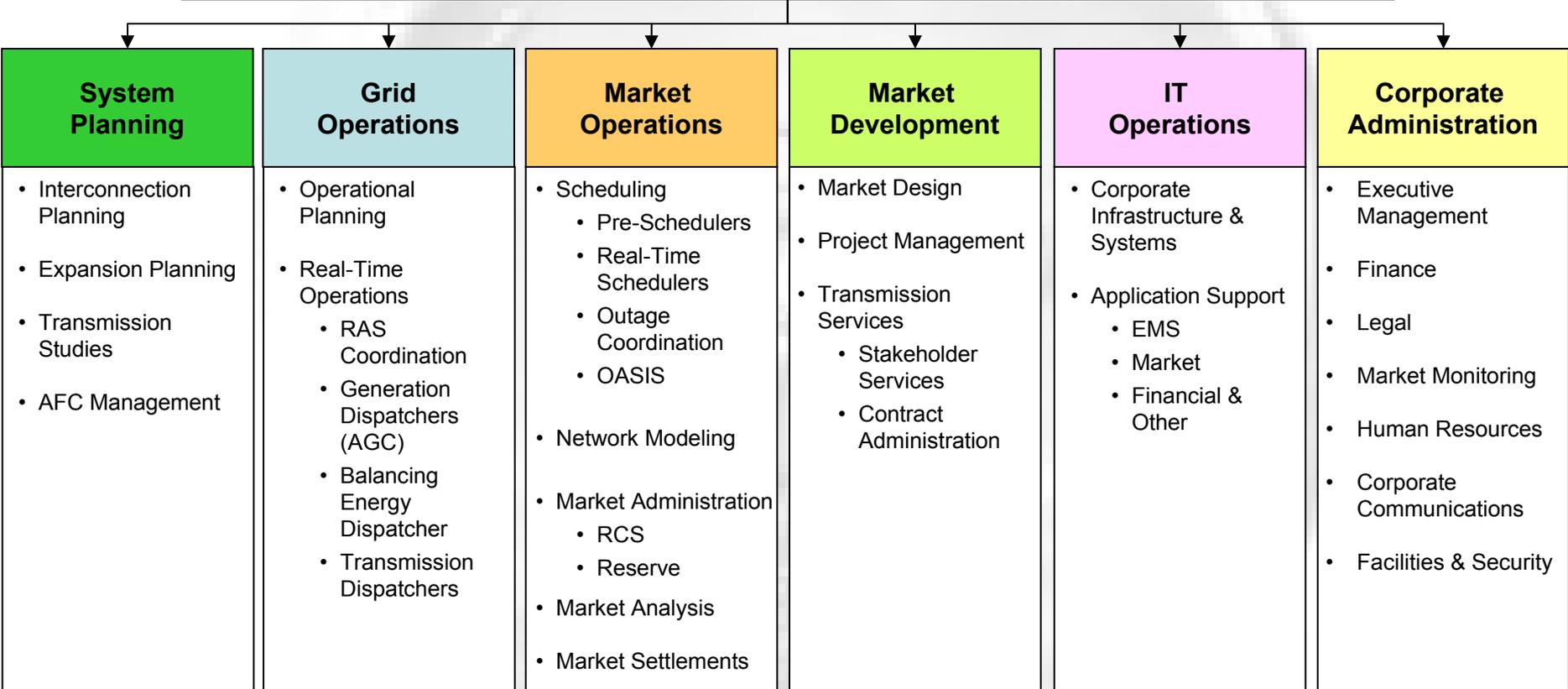
Operating Expenses

Employees: Results 1

Background	The Numbers	Operating Expenses	Startup Costs	Avoiding Costs
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Based on the defined functional scope, we assumed the following organization design...

Grid West



Operating Expenses

Employees: Drill Down

Background

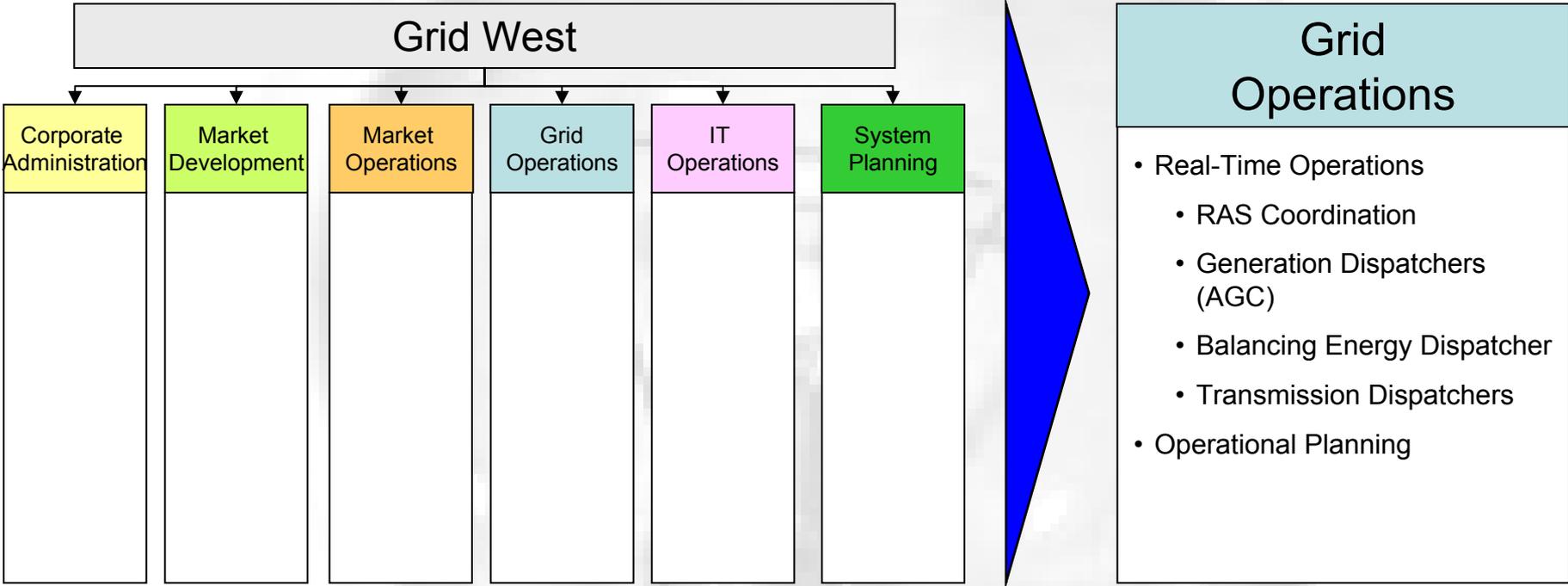
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

For each division and department we performed a resource assessment...



Grid Operations

Real-time Operations

Operating Expenses Employees: Drill Down

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Functional Scope & Assumptions

- Transmission Authority responsibilities for the GWMT and Balancing Authority responsibilities for CCA.
- RAS functionality similar to BPA
- Coordinate emergency operations together with PNSC/TO
- Operates Balancing Energy and Reserve Markets for CCA

Cost Factors

- Number of desks (aka "24x7" positions)
- Staffing of "24x7" positions
- Staffing of backup facility
- Control room facilities (consoles, mapboard, etc.)

Resource Requirements

Role	Description	Type	Count
Real-time Manager	Manages real-time grid operations	Non-shift	1
Dispatcher Training	Perform dispatcher training	Non-shift	6
Documentation/Business Process	Maintain operating procedures and business process doc.	Non-Shift	6
Shift Supervisor	Supervises control room	Shift	6
RAS Coordinator	Coordinates operation of RAS	Shift	6
Generation Dispatcher	Oversees generation control and dispatch activities	Shift	6
Balancing Energy Dispatcher	Oversees the balancing energy and reserve markets	Shift	6
Transmission Dispatcher	Oversees transmission system operations	Shift	12
Floating Resource	Assists real-time manager on various activities	Non-Shift	1
Totals			50



Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Functional Scope & Assumptions

- Develop and maintain operating procedures for GWMT
- Performs short-term operating studies: outages, what-if, voltage limits, line ratings, etc.
- Generation adequacy assessment not in scope.
- Participate in WECC working groups

Cost Factors

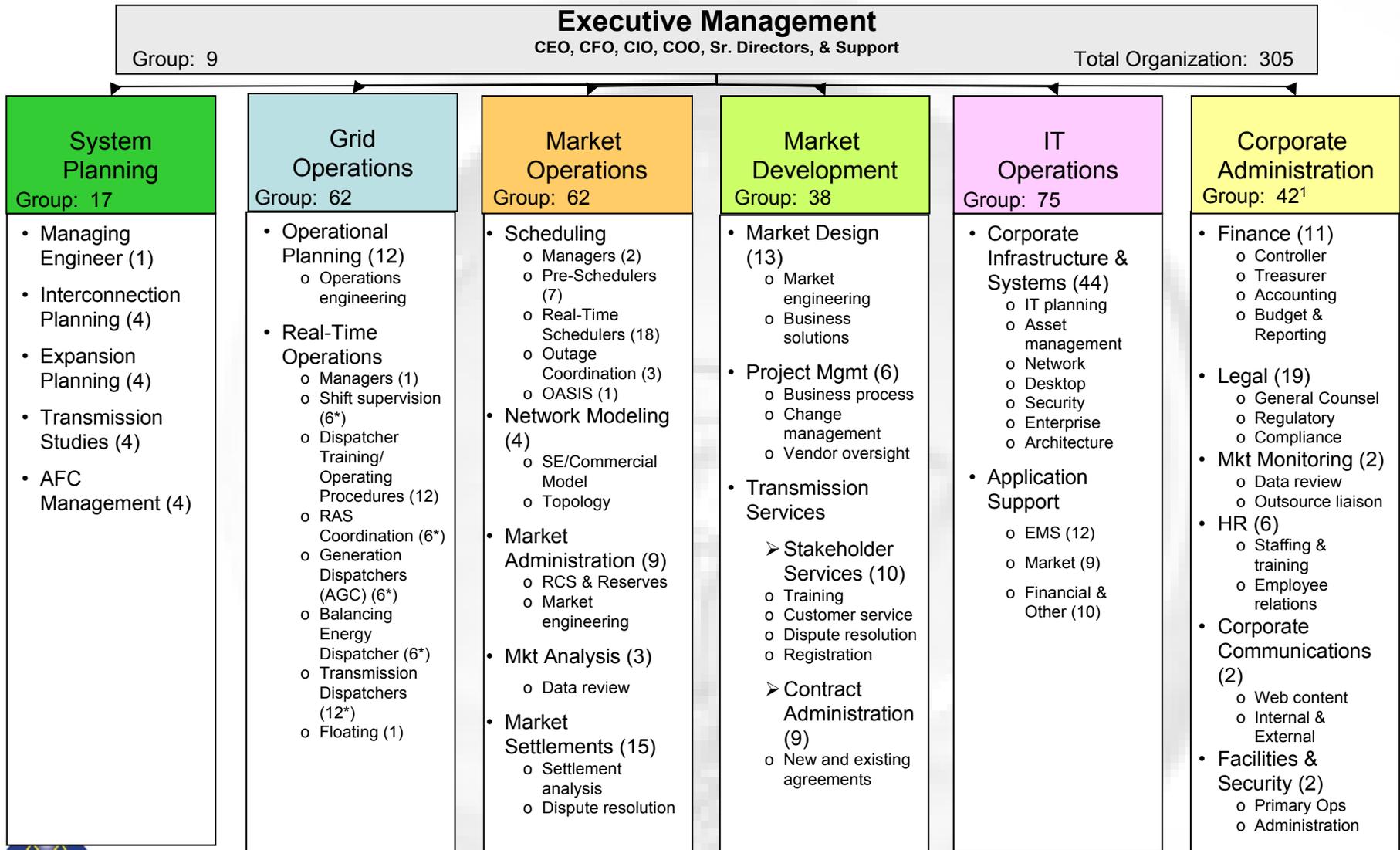
- Number of operations engineers
- Required tools
- Employee expenses

Resource Requirements

Role	Description	Type	Count
Operations Manager	Manages operation engineering activities.	Non-shift	1
Operations Engineer	Develops operating procedures, performs studies, etc.	Non-shift	11
Totals			12

Operating Expenses

Employees: Drill Down



Operating Expenses

Employees: Benchmarking 1

Background

The Numbers

Operating Expenses

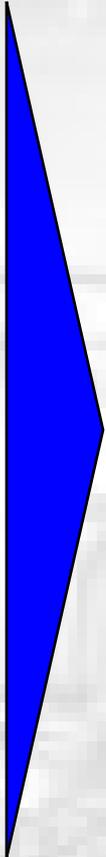
Startup Costs

Avoiding Costs

A variety of factors drive headcount within RTOs...

Headcount Drivers

- Market scope and complexity
- Frequency of market design changes
- Level of automation
- Geographic footprint
- Use of external resources
- Regulatory “X factor”
- Talent pool
- Cost conscious



ISO/RTO	1999*	2005
GridFlorida	N/A	194 (D1), 354 (D2)
Grid West	N/A	305
ISONE	227	428
NYISO	148	430
ERCOT	N/A	530
MISO	N/A	510
CAISO	341	587
PJM	301	650

* Source: CERA Report

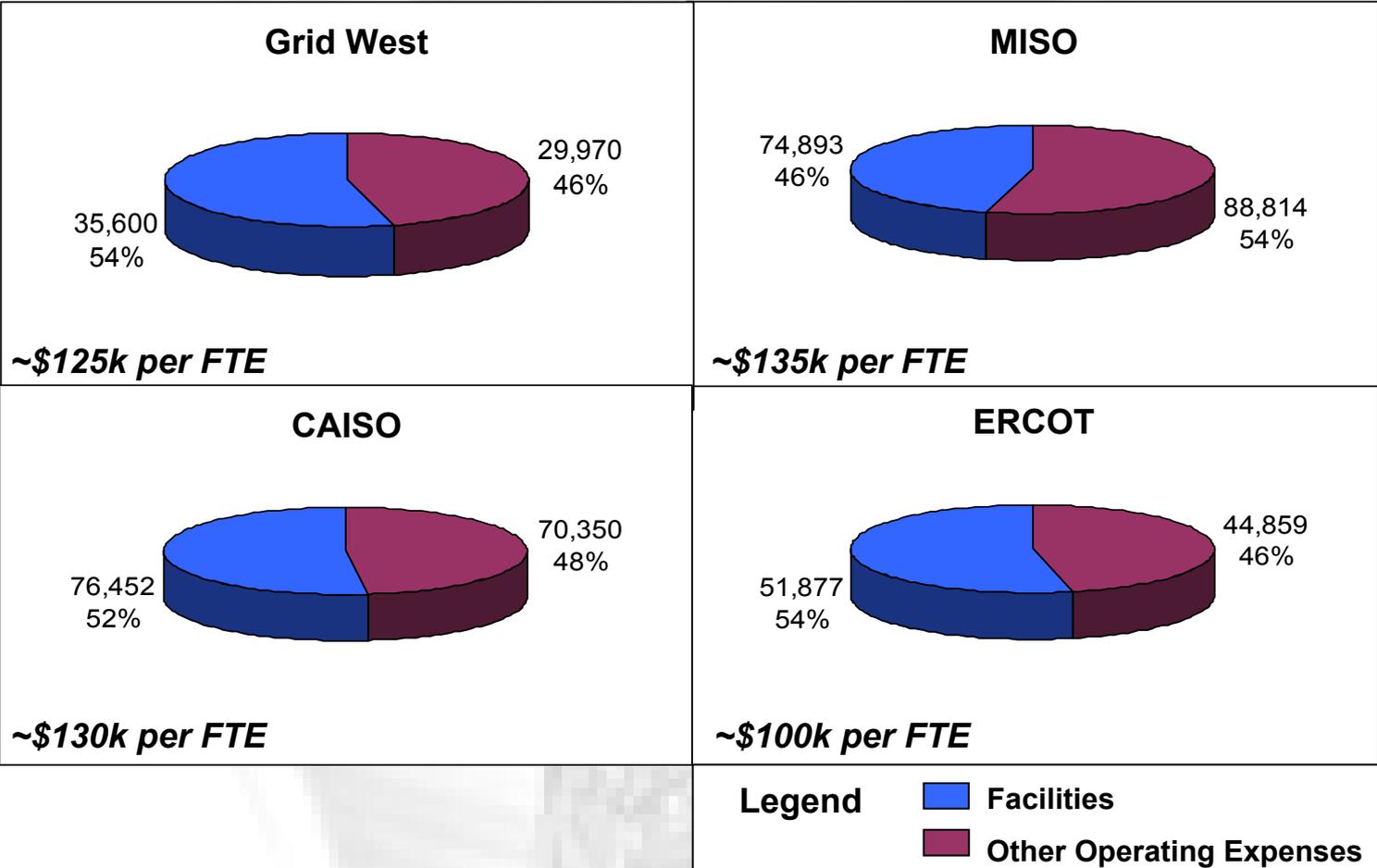


Operating Expenses

Employees: Benchmarking 2

Background	The Numbers	Operating Expenses	Startup Costs	Avoiding Costs
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Additionally, labor costs tend to be the largest operating expense...



Operating Expenses

Employees: Contribution to Costs

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Employee costs have the following impact on operating expenses...

Employee Summary

- Divisions: 6
- Departments: 24
- 24x7 positions: 9
- Staff per 24x7 position: 6
- Salary: Tiered structure
- Backup: Staffed
- FTEs: 305
- Benefits loading: 30%
- Employee expenses: \$7,000/FTE

\$40.8m

Employees - \$40.8m

Operating Expenses

Facilities: Approach

Background

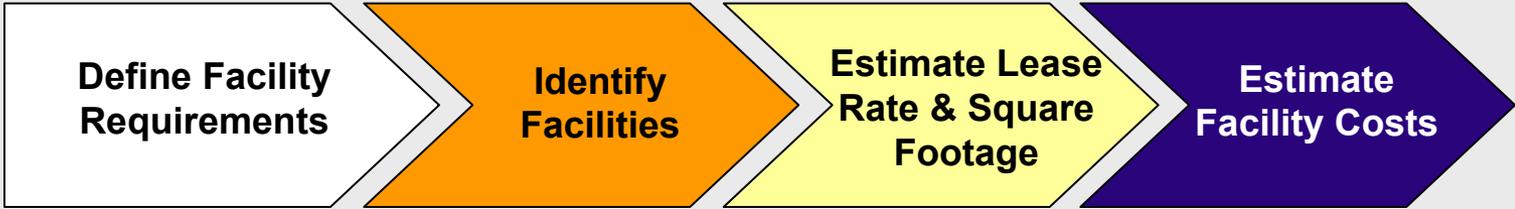
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Our Approach



Challenges

- Greenfield vs. brownfield site
- Facility configuration
- Annual lease cost
- Building services
- Limited facility space (Dittmer)

Assumptions

- Site: Brownfield
- Facilities: Three
 - Primary: BPA Dittmer facility
 - Backup: SPP Reno facility
 - Admin: Leased space
- Annual lease cost: \$19-\$27/sq. ft.
- Services included in operations facilities:
 - Building services, utilities, corporate voice



Operating Expenses

Facilities: Results 1

Background

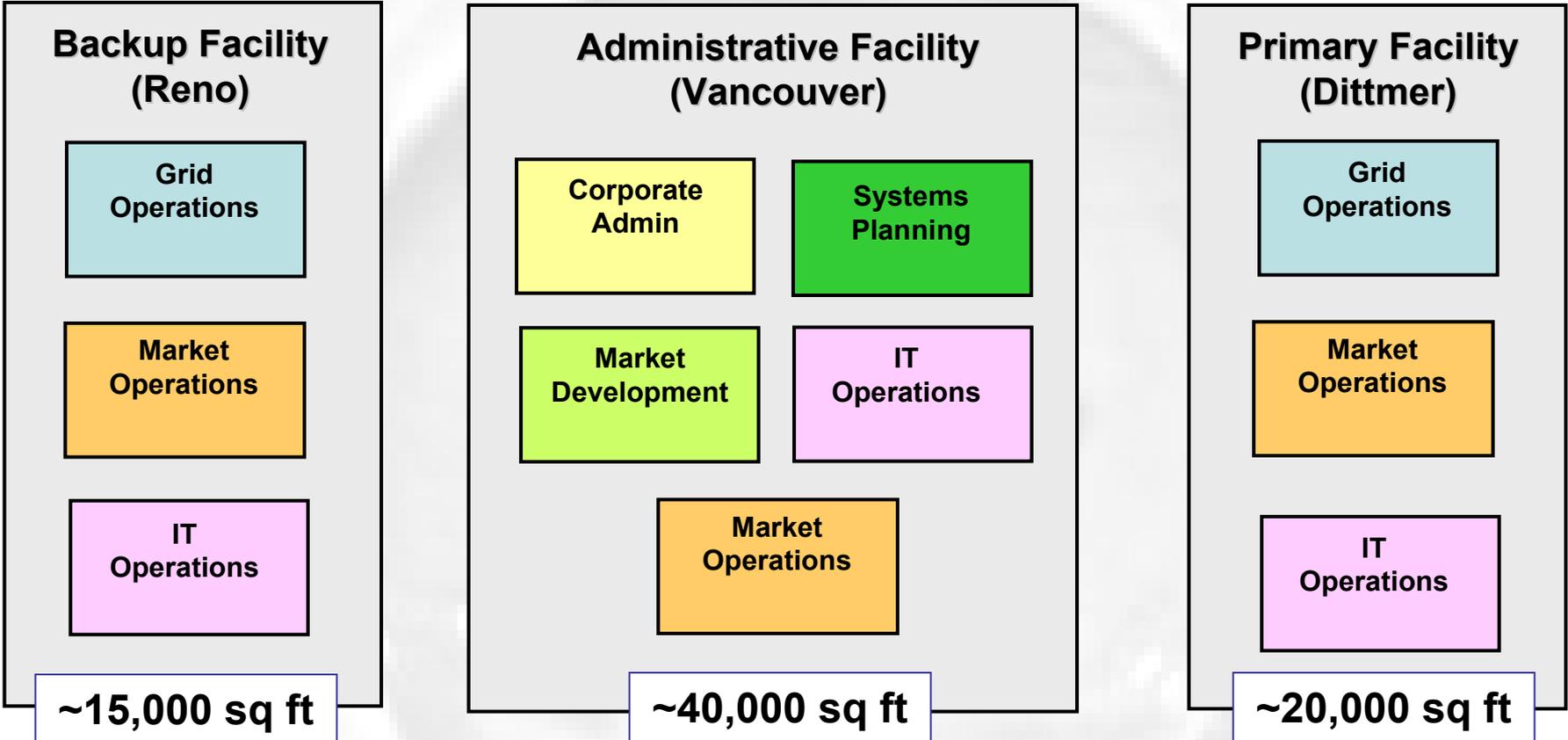
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Geographic Distance



Operating Expenses

Facilities: Results 2

Background	The Numbers	Operating Expenses	Startup Costs	Avoiding Costs
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The organization would be spread out across three facilities...

Backup Facility (Reno)

36 FTEs

- 3 shift desks
- 21 desks total

\$410,000 per year

Administrative Facility (Vancouver)

179 FTEs

- 0 shift desks
- 179 desks total

\$775,000 per year

Primary Facility (Dittmer)

90 FTEs

- 6 shift desks
- 60 desks total

\$460,000 per year

Operating Expenses

Facilities: Drill Down

Background	The Numbers	Operating Expenses	Startup Costs	Avoiding Costs
------------	-------------	--------------------	---------------	----------------

Facility	Lease Rate	Unit Cost	Total Cost
Primary	Lease	\$23-26 sq ft per year	\$460,600
	Furnishings	\$5/sq ft	\$95,500
	Data & Network	N/A	\$1,083,600
	Utilities, Voice, Building Services	<i>Included</i>	<i>Included</i>
Backup	Lease	\$27 sq ft per year	\$407,700
	Furnishings	\$5/sq ft	\$75,500
	Data & Network	N/A	\$1,083,600
	Utilities, Voice, Building Services	<i>Included</i>	<i>Included</i>
Admin	Lease	\$19 sq ft per year	\$775,200
	Furnishings	\$5/sq ft	\$204,000
	Data & Network	N/A	\$237,600
	Utilities, Voice, Building Services	N/A	\$1,500,000



Operating Expenses Facilities: Benchmarking

Background

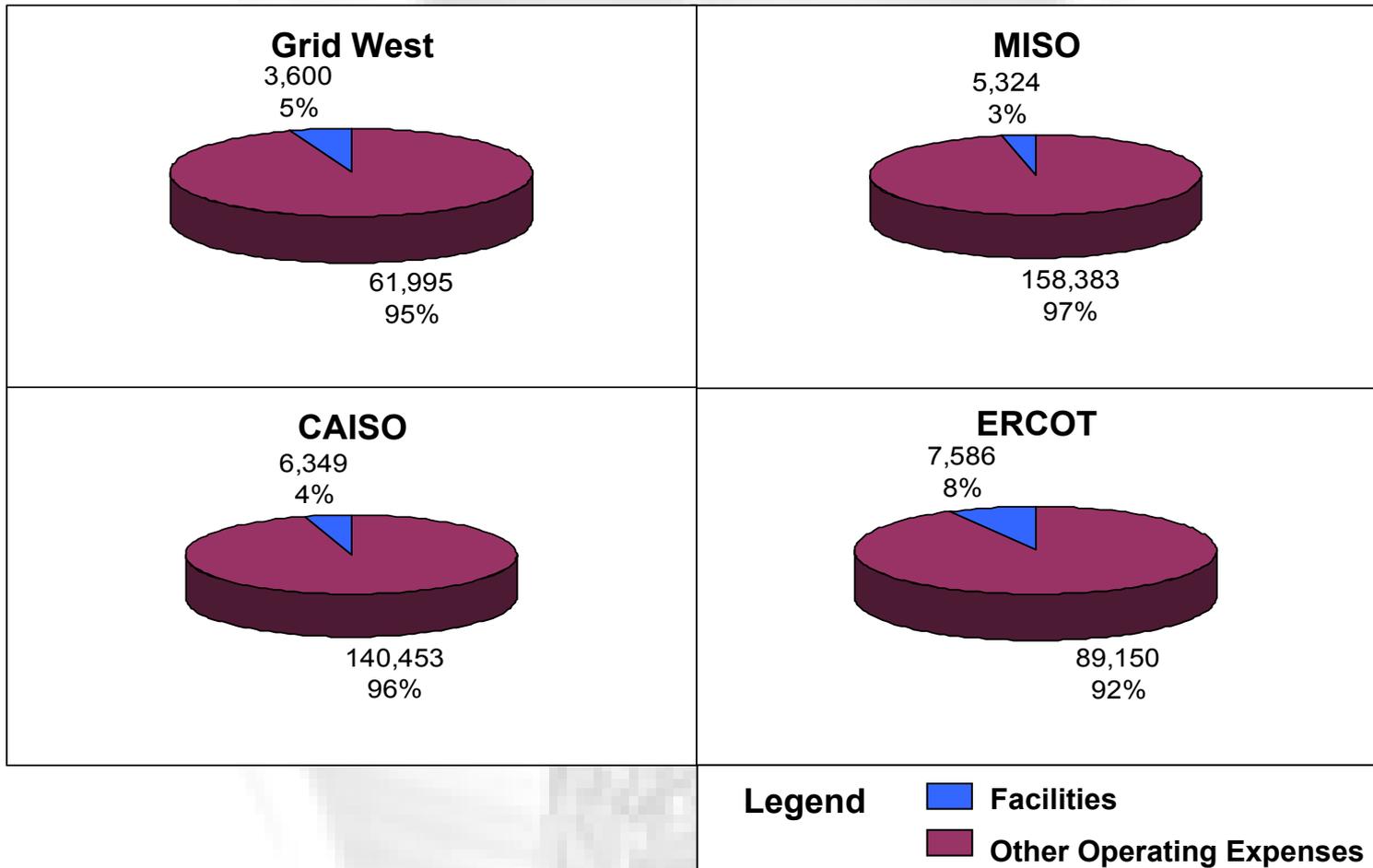
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Most RTOs/ISOs lease their facilities. These costs represent roughly 3-8% of total annual O&M expenses...



Operating Expenses

Facilities: Contribution to Costs

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Facility costs, which include data & network costs, have the following impact on operating expenses...

Facility Summary

- Site: Brownfield
- Facilities: Three
 - Primary: BPA Dittmer facility
 - Backup: SPP Reno facility
 - Admin: Leased space
- Annual lease cost: \$19-\$27/sq. ft.
- Services included in operations facilities:
 - Building services, utilities, corporate voice

\$47.4m

Facilities - \$6.6m

Employees -\$40.8m

Operating Expenses

Systems: Approach

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Our Approach



Challenges

- System groups
- Hardware O&M rate
- Software O&M rate

Assumptions

- System Groups: 4
 - Real-time Monitoring Systems, Transmission Systems, CCA Market Systems, Corporate Systems
- Hardware/Software O&M Rate:
 - Flat 15%

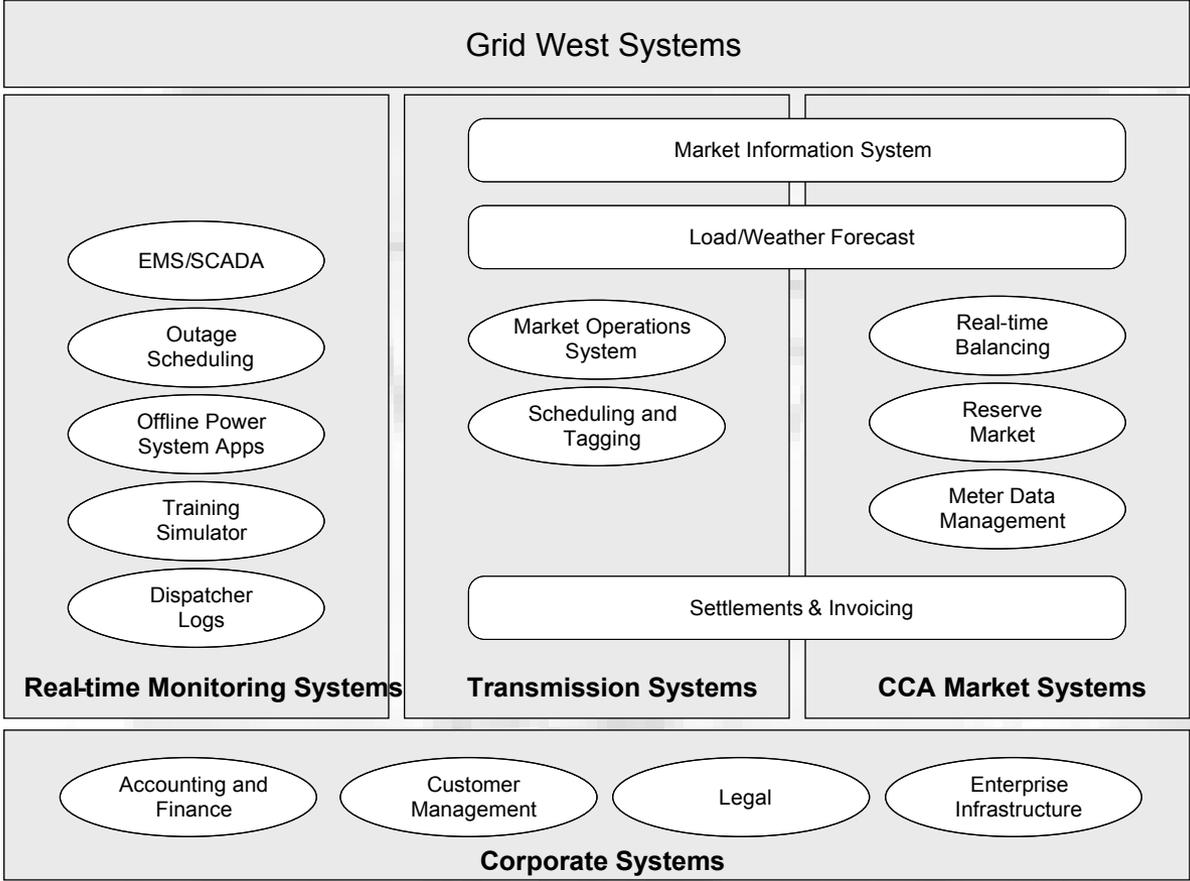


Operating Expenses

Systems: Results

Background	The Numbers	Operating Expenses	Startup Costs	Avoiding Costs
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Based on the Grid West service model, we have assumed the following systems are required...



Operating Expenses

Systems: Drill Down

Background	The Numbers	Operating Expenses	Startup Costs	Avoiding Costs
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We have assumed that system operating expenses will be 15% of the initial capital expenditure...

System Group	Software O&M	Hardware O&M	Total
Real-time Monitoring Systems	\$1,062,000	\$533,000	\$1,594,000
Transmission Systems	\$1,072,000	\$278,000	\$1,351,000
CCA Market Systems	\$1,035,000	\$292,000	\$1,327,000
Corporate Systems	\$679,000	\$281,000	\$960,000
Totals	\$3,848,000	\$1,384,000	\$5,232,000

Operating Expenses Systems: Benchmarking

Background

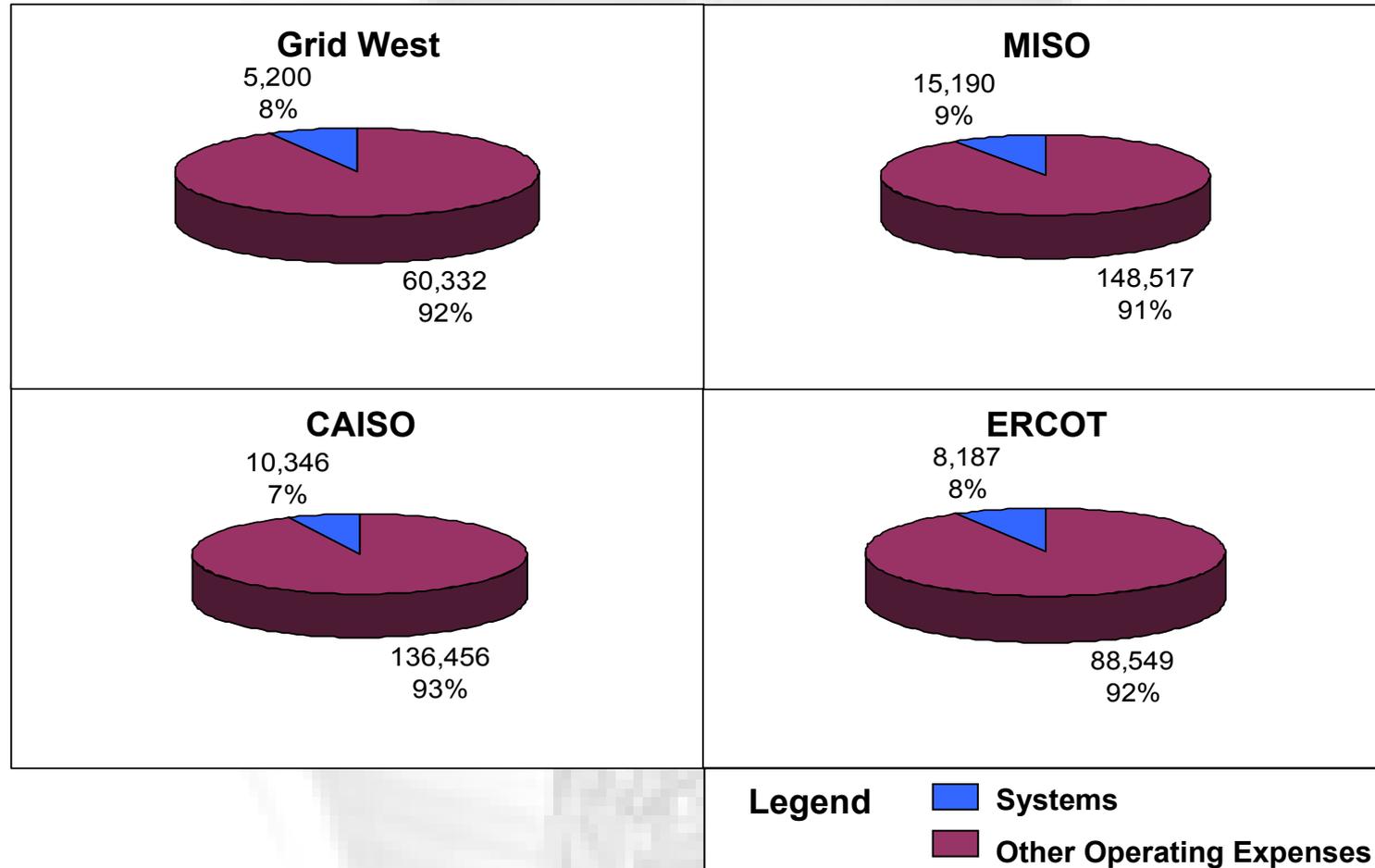
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Ongoing costs for systems are largely dependent on the initial systems costs and the negotiated maintenance rates...



Operating Expenses

Systems: Contribution to Costs

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

System costs have the following impact on operating expenses...

Systems Summary

- System Groups: 4
 - Real-time Monitoring Systems, Transmission Systems, CCA Market Systems, Corporate Systems
- Hardware/Software O&M Rate:
 - Flat 15%

\$52.6m

Systems -\$5.2m

Facilities - \$6.6m

Employees -\$40.8m

Operating Expenses

Outside Services: Approach

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Our Approach



Challenges

- Software enhancements
- Outsourced functions
- External consulting support

Assumptions

- Limited market changes
- Stable IT platform
- Enhancements:
 - 10% of initial system costs
- Consulting Services:
 - To fill skills gaps
- Outsourced Services:
 - Audit, legal (external), market monitoring, human resources



Operating Expenses

Outside Services: Results

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Ongoing outside services costs depend greatly on market changes...

Service	Total
Ongoing Production Support	\$1,000,000
Cyber Security Audit	\$500,000
Financial Audit	\$500,000
External Legal	\$1,200,000
Market Monitoring	\$1,000,000
<i>Sub Total</i>	<i>\$4,200,000</i>
<i>System Enhancements (10% of initial cost)</i>	<i>\$4,000,000</i>
<i>Total</i>	<i>\$8,200,000</i>

Operating Expenses

Outside Services: Contribution to Costs

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Outside service costs have the following impact on operating expenses...

Outside Services Summary

- Outsourced Services:
 - Audit, legal (external), market monitoring, human resources
- System Enhancements:
 - 10% of initial system costs
- Consulting Services:
 - Small teams used to fill skill gaps and smooth out peaks

\$60.8m

Outside Services - \$8.2m

Systems -\$5.2m

Facilities - \$6.6m

Employees -\$40.8m

Operating Expenses

Other: Approach

Background

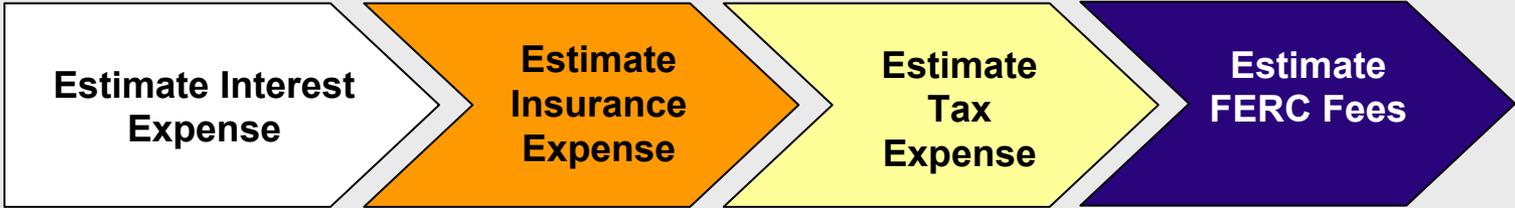
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Our Approach



Challenges

- Financing model
- Insurance options
- Tax exposure
- FERC Fees

Assumptions

- Financing: Bond issuance with 2.3% flotation costs
- Interest carrying costs: 5.5%
- Required insurance:
 - Property & Liability
 - Directors & Officers
 - Professional Liability
- Applicable taxes:
 - Property taxes
 - B&O taxes
- Incremental FERC Fees: \$2m



Operating Expenses

Other (Interest): Results 1

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

The interest expense will depend on the financing terms and is estimated as follows...

Line Item	Amount
Capital Expenditures	~\$117,000,000
Flotation Costs (@ 2.3%)	~\$3,000,000
<i>Sub Total</i>	<i>~\$120,000,000</i>
Interest Rate	~5.5%
<i>Interest Expense</i>	<i>\$6,600,000</i>

Operating Expenses

Other (Interest): Benchmarking 1

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

The interest expenses of existing RTOs/ISOs depend on their financing terms, how much has been repaid to date and how many new projects have been implemented. Interest rates are...

RTO	Interest Rate	Source
ERCOT	6.17%	2004 Fee Case
PJM	5.5%	2005 Budget
MISO	8.75% \$100m notes due 2012 4.62% \$100m notes due 2013 4.49% \$125m notes due 2014 3.61% \$80m notes due 2009	2005 Budget
GridFlorida	4.2% Interest During Construction 5.5% Operating	April 20, 2005 ICF Report

Operating Expenses

Other (Insurance): Results 2

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Since Grid West has not proposed any financial markets, we have assumed that it will have insurance requirements similar to that of other non-financial RTOs/ISOs...

Insurance Type	Estimate
General & Professional Liability	~\$1,200,000
Directors & Officers	~\$500,000
Other	~\$300,000
Total	~\$2,000,000

Operating Expenses

Other (Insurance): Benchmarking 2

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Most ISOs/RTOs have similar insurance costs; however, those with financial markets require additional credit insurance...

ISO/RTO	Annual Insurance Cost	Comments
CAISO	\$1.90 million FY2005	Down from \$2.25 million FY2004
ERCOT	\$1.75 million FY2004	
ISO-NE	\$2.26 million FY2005	Down from \$2.87 FY 2004 budget
MISO	\$3.5 million FY2005	Directors & Officers Professional Liability Property & Casualty
NYISO	\$6.8 million FY2005	\$3.8 Property & Liability \$1.7 Credit \$1.3 Directors & Officers Down from \$7.7 million FY2004

Operating Expenses

Other: Contribution to Costs

Background

The Numbers

Operating Expenses

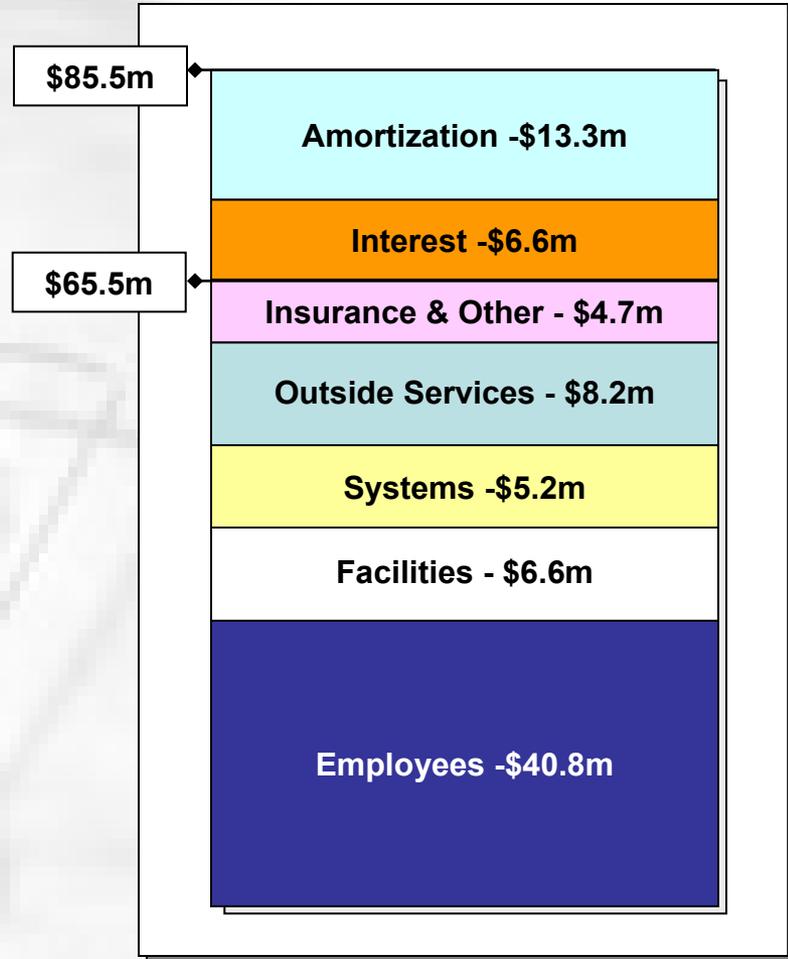
Startup Costs

Avoiding Costs

Other costs (e.g., insurance, etc.) have the following impact on operating expenses...

Other Summary

- Financing: Bond issuance with 2.3% flotation costs
- Interest carrying costs: 5.5%
- Required insurance:
 - Property & Liability
 - Directors & Officers
 - Professional Liability
- Applicable taxes:
 - Property taxes
 - B&O taxes
- Incremental FERC fees: ~\$2m



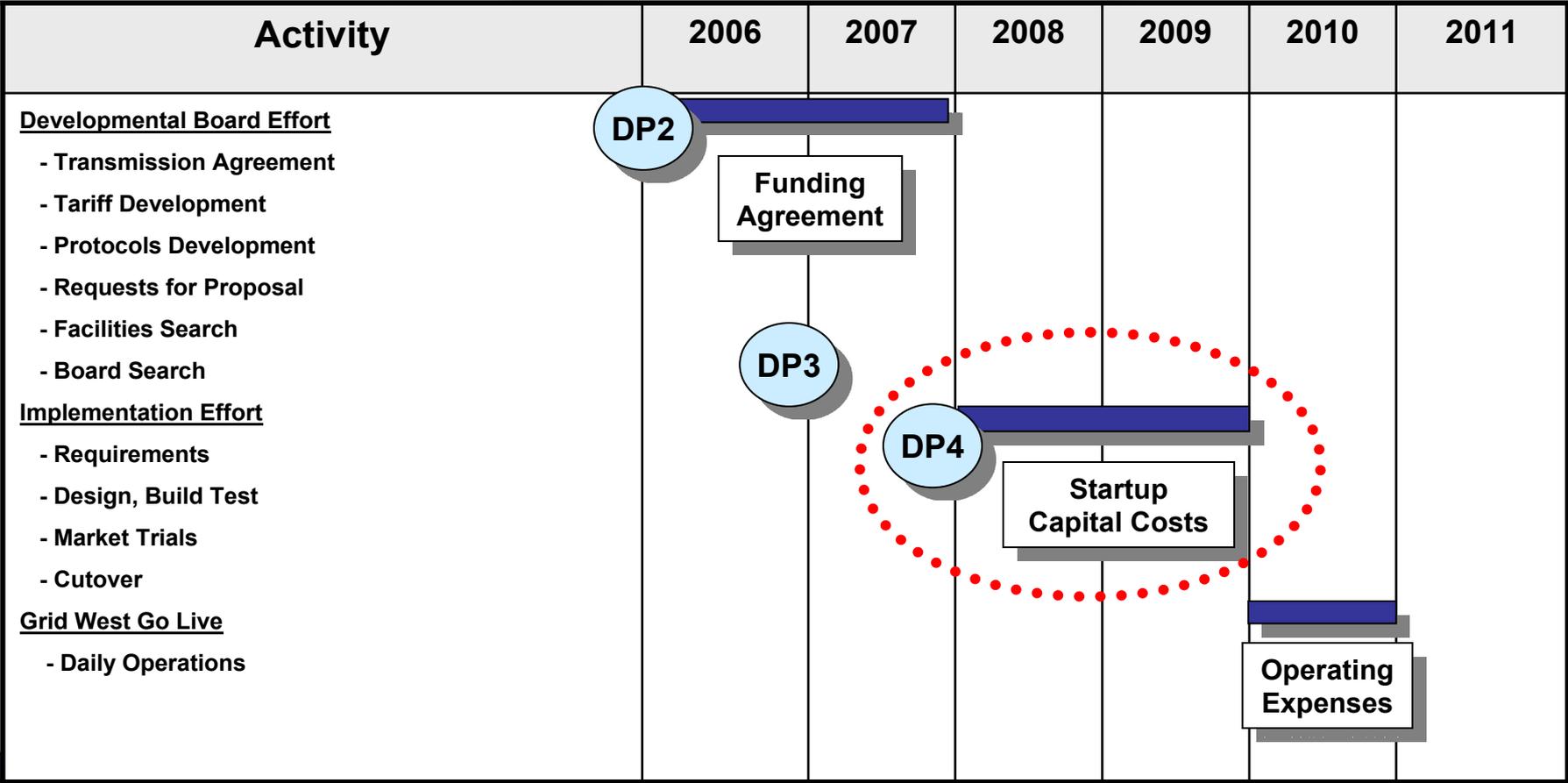
Startup Costs

Operating Expenses

Key Assumptions

Background	The Numbers	Operating Expenses	Startup Costs	Avoiding Costs
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This section focuses on Grid West start-up costs...



Startup Costs Overview

Background

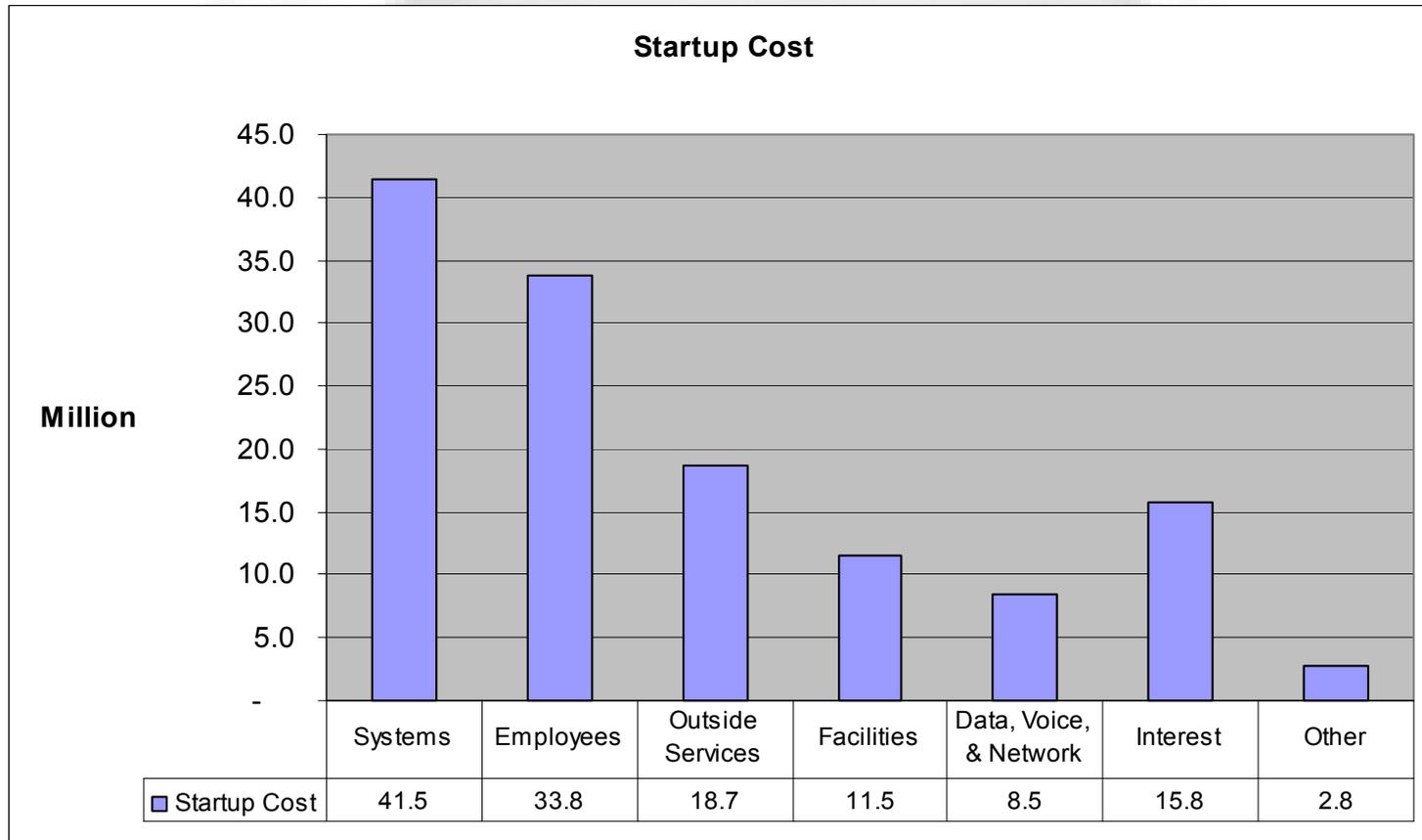
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Based on our assumptions, we have estimated Grid West's start-up costs to be \$133 million...



Startup Costs

Key Components

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

The following are key components of startup costs...

Cost Driver	Grid West
Implementation Plan	N/A
Systems	~ 31%
Employees	~ 26%
Outside Services	~ 14%
Facilities	~ 9%
Data, Voice, Network	~ 6%

We have used the following format to present our findings...

- Approach (Steps, Challenges, & Assumptions)
- Results
- Drill Down
- Contribution to Costs

Startup Costs

Systems: Approach

Background

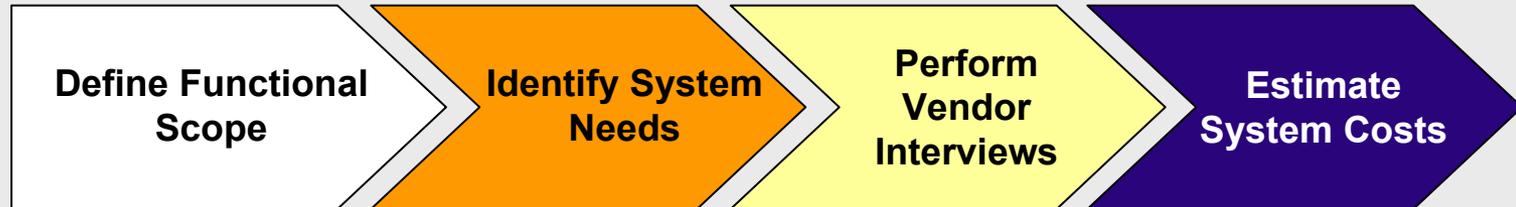
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Our Approach



Challenges

- Stability of market design
- System groups
- Development costs
- Hardware costs
- O&M (during implementation)
- CCA vs. Non-CCA

Assumptions

- Stable and approved
- Four system groups
 - Real-time monitoring systems, Transmission systems, CCA Market systems, Corporate systems
- Vendor quotes include:
 - Hardware/Software costs
 - Development costs
- O&M during implementation:
 - Hardware only

Startup Costs

Systems: Results 1

Background

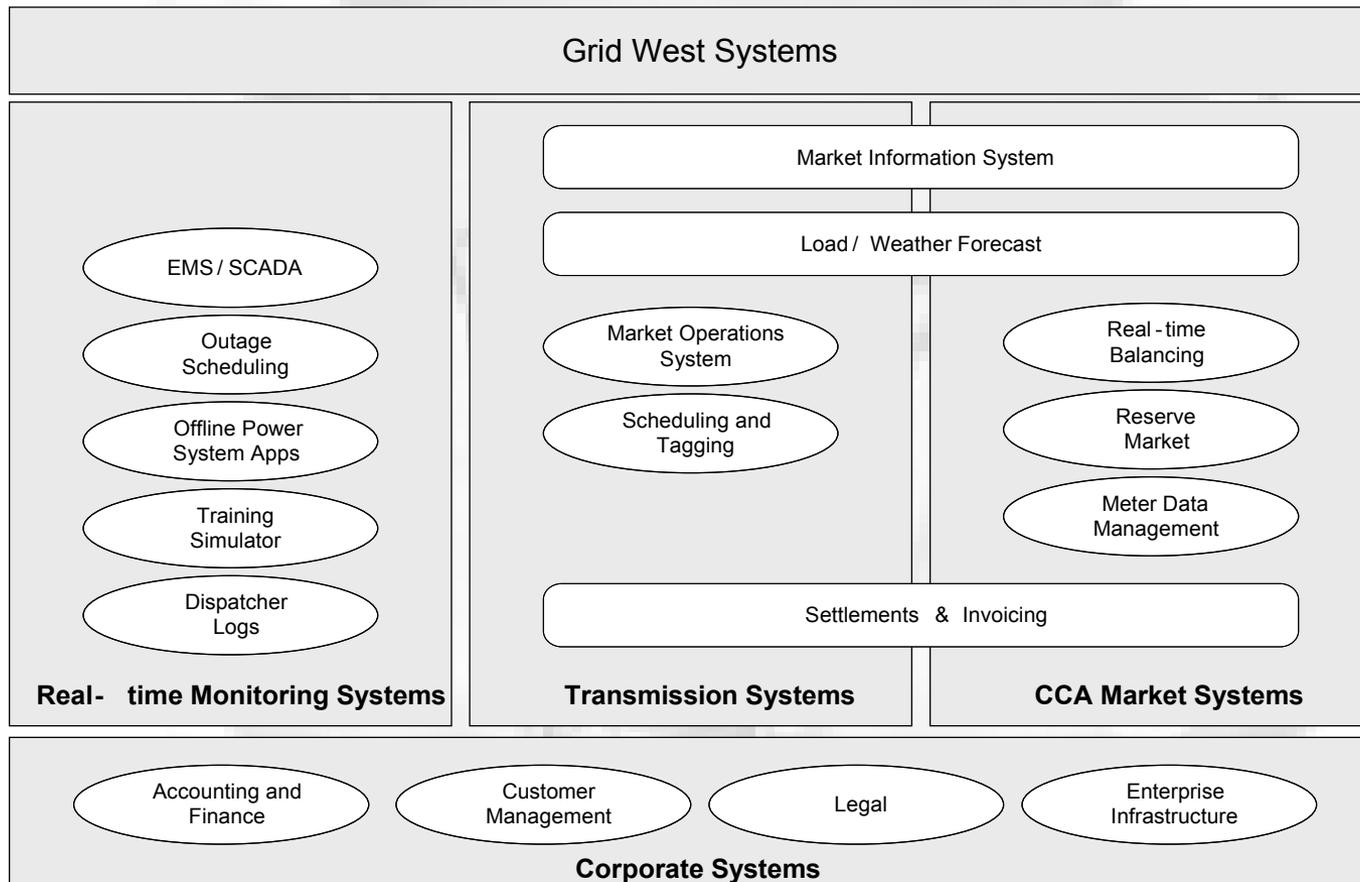
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Based on the Grid West service model, we have assumed the following systems are required...



Startup Costs Systems: Results 2

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Thank you to the following vendors who helped provide system quotes...



SNC



Powertech



ABB



**EVANS
CONSOLES**



CELEBRATING
25
YEARS



Nexant OUR FOCUS IS ENERGY



AREVA



Itron



OATI

Open Access
Technology International,
Inc.



LAWSON



SIEMENS

Power Technologies International

Startup Costs

Systems: Drill Down

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

The vendor quotes include software, hardware (primary & backup), and configuration costs...

System Group	Software	Hardware Primary	Hardware Backup	Total
Real-time monitoring systems	\$8,142,000	\$2,472,000	\$1,610,000	\$12,224,000
Transmission systems	\$8,222,000	\$1,067,000	\$1,067,000	\$10,356,000
CCA market systems	\$7,935,000	\$1,118,000	\$1,118,000	\$10,172,000
Corporate systems	\$5,204,000	\$2,155,000	\$0	\$7,359,000
Total	\$29,503,000	\$6,813,000	\$3,795,000	\$40,111,000

Note: Start-up costs include approximately ~\$1.4m of hardware O&M costs that are incurred during implementation....

Startup Costs

Systems: Contribution to Costs

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

System costs have the following impact on startup costs...

Systems Summary

- Four system groups
 - Real-time monitoring systems, Transmission systems, CCA Market systems, Corporate systems
- Vendor quotes include:
 - Hardware/Software costs
 - Development costs
- O&M during implementation:
 - Hardware only
- GW is the Transmission Authority

\$41.5 m

Systems -\$41.5m

Startup Costs

Key Components

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

The implementation plan drives the following costs...

- **Employees** – the longer the implementation, the higher the pre-operational labor costs
- **Outside Services** – the longer the implementation, the higher the consulting costs
- **Facilities** – the longer the implementation, the higher the pre-operational facility costs

Because of this, lets first look at the proposed implementation plan...

Startup Costs

Implementation Plan: Approach

Background

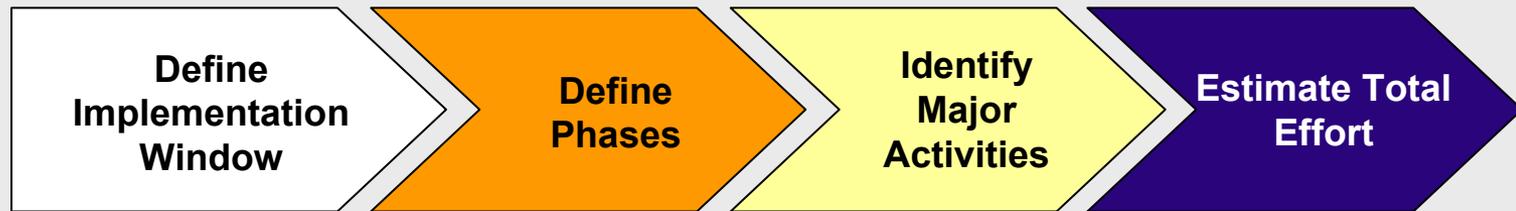
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Our Approach



Challenges

- Type of implementation
- Phasing approach
- Length of implementation
- Number of phases
- Resource mix
- External effort estimate

Assumptions

- Type: Phased implementation
- Phases: 3
 - Phase 1 = Real-time Monitoring
 - Phase 2 = Transmission Systems
 - Phase 3 = CCA Market Systems
- Length: 24 months
- External effort: ~11,500 days



Startup Costs

Implementation Plan: Results 1

Background

The Numbers

Operating Expenses

Startup Costs

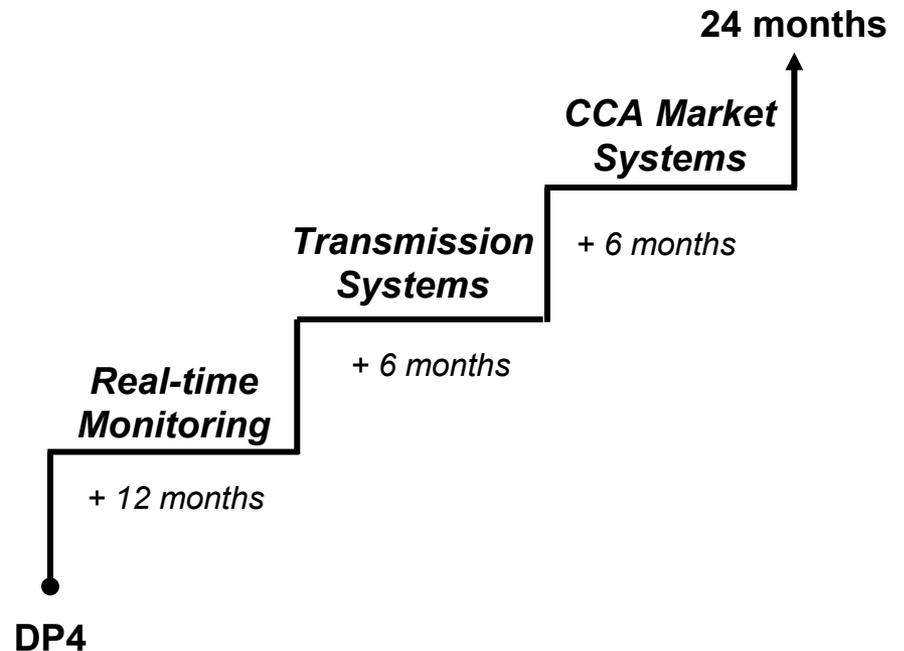
Avoiding Costs

The Implementation plan includes three major phases that build on one another...

Grid West Evolution

- **Phase 1: Real-time Monitoring** – This phase includes the core EMS/SCADA systems.
- **Phase 2: Transmission Systems** – This phase includes the transition to flow-based scheduling and RCS auctions.
- **Phase 3 – CCA Market Systems** – This phase includes the implementation of the balancing and reserve markets.

Implementation Timeline



The implementation plan has a direct impact on the following cost categories...

Implementation Summary

- Type: Phased implementation
- Phases: 3
 - Phase 1 = Real-time Monitoring Systems and Corporate Systems
 - Phase 2 = Transmission Systems
 - Phase 3 = CCA Market Systems
- Length: 24 months
- Consultants: All temporary roles
- External Effort: ~11,500 days

See Employee Startup Costs

See Outside Services Startup Costs

See Facility Startup Costs

Startup Costs

Employees: Approach

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Our Approach



Challenges

- Treatment of labor costs
- Compensation model
- Hiring plan

Assumptions

- Implementation labor & benefits:
 - Pre-operational expenses
- Compensation model:
 - Tiered
- Phased hiring plan
 - Phase 1 = Q4'2007 (dept heads)
 - Phase 2 = Q2'2008 (key staff)
 - Phase 3 = Q2'2009 (support staff)
 - Phase 4 = Q3'2009 (remaining staff)



Startup Costs

Employees: Results

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

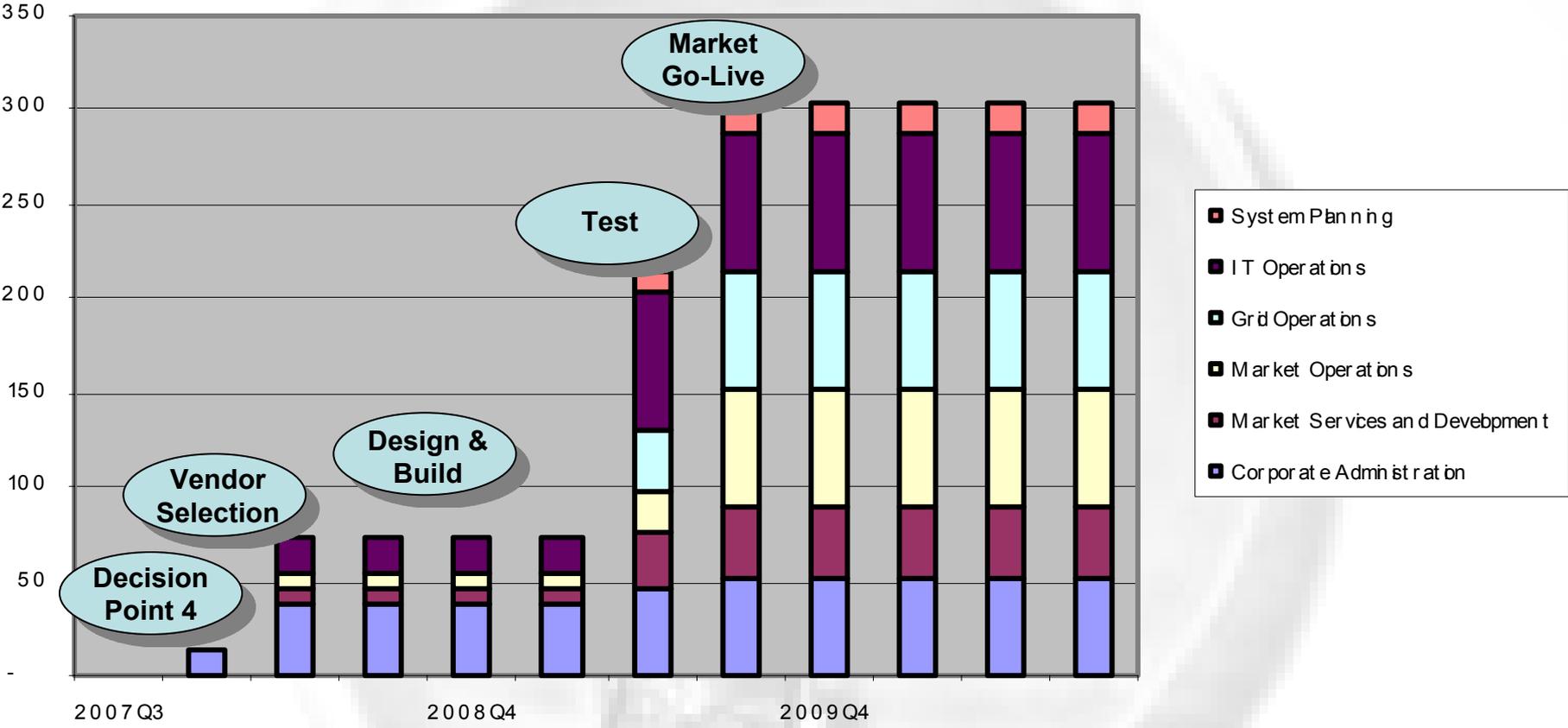
Based on the implementation plan, we assumed the following key hiring dates...

Phase	Date	Milestone	# Hired	Total Hired
1	Q4'2007	Decision Point 4	20	20
2	Q2'2008	Design & Build Begins	75	95
3	Q2'2009	Testing Begins	150	245
4	Q3'2009	Market Go-live	60	305

Startup Costs

Employees: Drill Down

Background	The Numbers	Operating Expenses	Startup Costs	Avoiding Costs
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Startup Costs

Employees: Contribution to Costs

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Employee costs have the following impact on startup costs...

Employees Summary

- Implementation labor & benefits:
 - Pre-operational expenses
- Compensation model: Tiered
- Phased hiring plan
 - Phase 1 = Q4'2007 (dept heads)
 - Phase 2 = Q2'2008 (key staff)
 - Phase 3 = Q2'2009 (support staff)
 - Phase 4 = Q3'2009 (remaining staff)

\$75.3 m

Employees -\$33.8m

Systems -\$41.5m

Startup Costs

Outside Services: Approach

Background

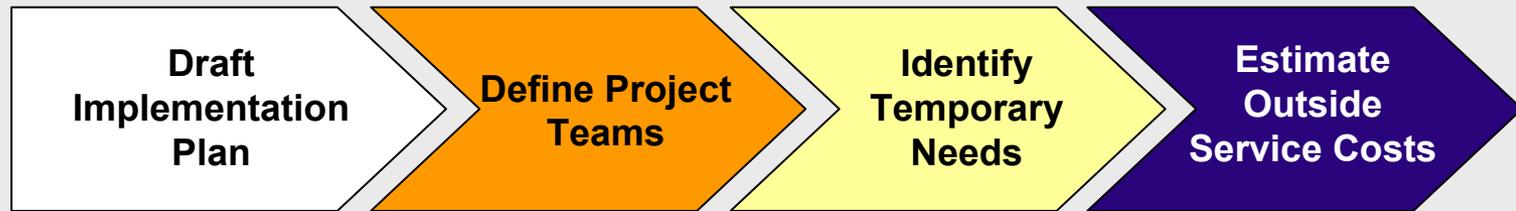
The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Our Approach

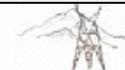


Challenges

- Implementation horizon
- Phasing
- Services
- External effort estimate

Assumptions

- Implementation: 24 months
- Phasing: 3 phases
- Services:
 - Implementation
 - External Legal
 - Audit (Financial & Security)
- External effort: ~11,500 days



Startup Costs

Outside Services: Results

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Based on the implementation plan, have assumed the following outsider service requirements...

Service	Days
Implementation	9,630
External Legal	800
Financial Audit	600
Security Audit	400
Total	11,430



Estimated Outside Services Costs:

~\$18,700,000

Startup Costs

Outside Services: Drill Down

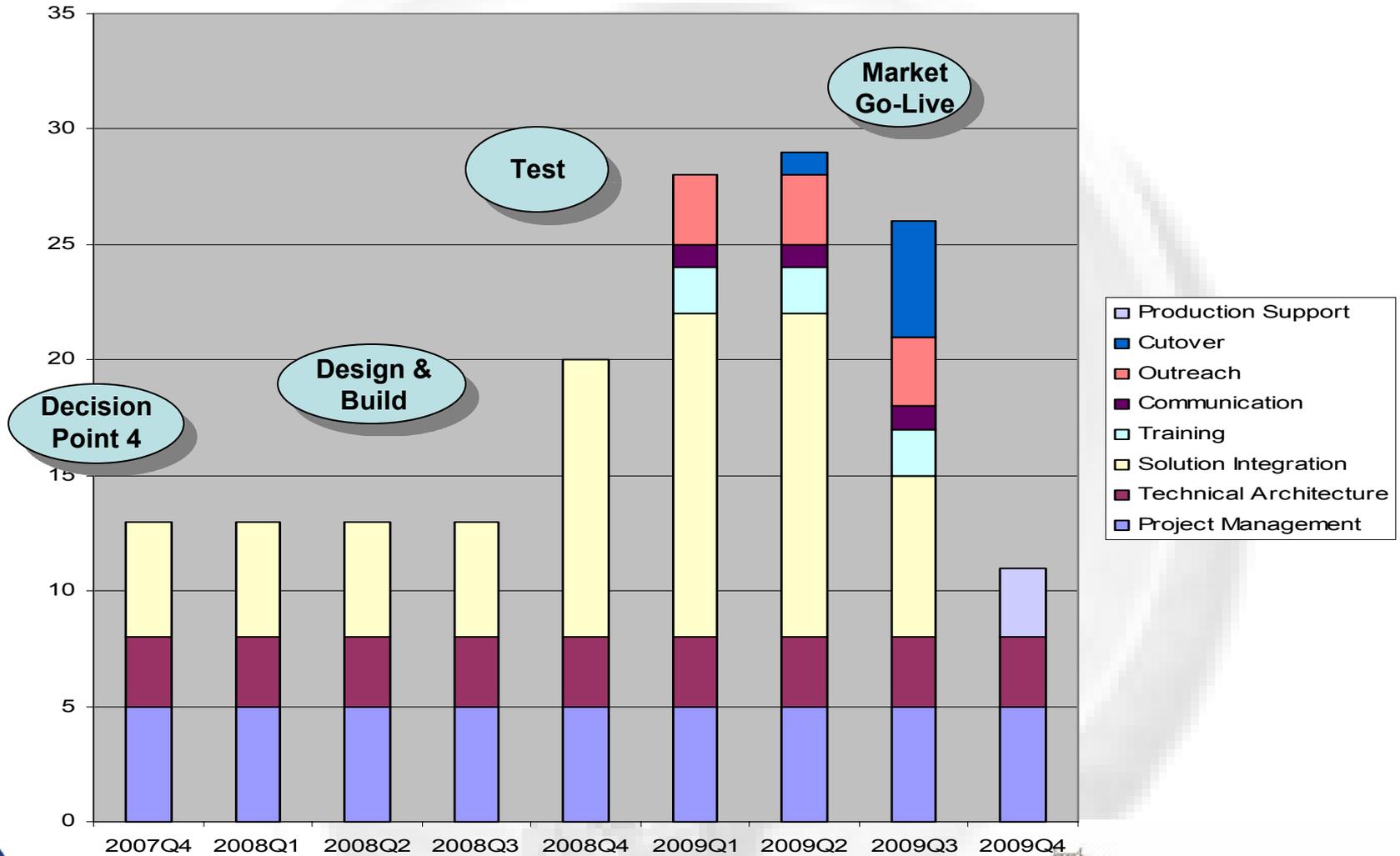
Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs



Startup Costs

Outside Services: Contribution to Costs

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Outside service costs have the following impact on startup costs...

Outside Service Summary

- Implementation: 24 months
- Phasing: 3 phases
- Services:
 - Implementation
 - External Legal
 - Audit (Financial & Security)
- External effort: ~11,500 days

\$94.0 m

Outside Services - \$18.7m

Employees - \$33.8m

Systems - \$41.5m

Startup Costs

Facilities: Approach

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Our Approach

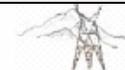


Challenges

- Facility configuration
- Infrastructure
- CIPS compliance
- Leasehold Improvements
- Voice & data communications

Assumptions

- 3 Facility Configuration
 - Primary: BPA Dittmer facility
 - Backup: SPP Reno facility
 - Admin: Leased space
- Some leveragable infrastructure
 - Control room facilities, data links.
- CIPS compliant
 - Dittmer
 - Reno



Startup Costs

Facilities: Results

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Facility	Lease Rate	Unit Cost	Total Cost
Primary	Leasehold Improvements	\$50/sq ft for control room \$25/sq ft other space \$750,000 UPS \$262,500 consoles \$3,556,000 data/network	\$5,343,500
	Preoperational Lease	\$26/sq ft per year control room \$23/sq ft per year other space	\$921,200
	Preoperational Expenses	\$5/sq ft furniture	\$191,000
Backup	Leasehold Improvements	\$50/sq ft for control room \$25/sq ft other space \$750,000 UPS \$165,000 consoles \$3,556,000 data/network	\$5,026,000
	Preoperational Lease	\$20/sq ft per year	\$815,400
	Preoperational Expenses	\$5/sq ft furniture	\$151,000
Admin	Leasehold Improvements	\$35 sq ft \$750,000 UPS \$1,402,000	\$3,580,000
	Preoperational Lease	\$19/sq ft per year	\$1,219,800
	Preoperational Expenses	\$5/sq ft furniture, utilities, building services	\$2,775,888
TOTAL			\$20,000,000



Startup Costs

Facilities: Contribution to Costs

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Facility costs have the following impact on startup costs...

Facilities Summary

- 3 Facility Configuration
 - Primary: BPA Dittmer facility
 - Backup: SPP Reno facility
 - Admin: Leased space
- Some leveragable infrastructure
 - Control room facilities, data links.
- CIPS compliant
 - Dittmer
 - Reno

\$116.8 m



Our Approach



Challenges

- Interest Rate
- Insurance options
- Hiring Plan

Assumptions

- Implementation: 24 months
- Interest carrying costs: 5.5%
- Required insurance:
 - Property & Liability
 - Directors & Officers
 - Professional Liability
- Employee costs: pro-rated



Other (Interest & Flotation Expense): Results 1

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

The interest expense will depend on the financing terms and is estimated as follows...

Line Item	Amount
Capital Expenditures	~\$117,000,000
Flotation Costs (@ 2.3%)	~\$3,000,000
<i>Sub Total</i>	<i>~\$120,000,000</i>
Interest Rate	~5.5%
<i>Interest During Construction (24 months)</i>	<i>\$13,150,000</i>

Startup Costs

Other (Insurance): Results 1

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Since Grid West has not proposed any financial markets, we have assumed that it will have insurance requirements similar to that of other non-financial RTOs/ISOs...

Insurance Type	Estimate
General & Professional Liability	~\$1,200,000
Directors & Officers	~\$500,000
Other	~\$300,000
<i>Total</i>	~\$2,000,000
<i>Pro-rated for Start-up</i>	~1,500,000

Startup Costs

Other: Contribution to Costs

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

Other costs (e.g., interest, etc.) have the following impact on startup costs...

Other Summary

- Implementation: 24 months
- Interest carrying costs: 5.5%
- Required insurance:
 - Property & Liability
 - Directors & Officers
 - Professional Liability
- Employee costs: pro-rated

\$133 m

Interest & Flotation -\$15.8m

Insurance & Other - \$2.8m

Facilities -\$20m

Outside Services - \$18.7m

Employees -\$33.8m

Systems -\$41.5m

Avoiding Costs

The following should be kept in context when evaluating potential Grid West costs:

- Wholesale scope, no retail components
- Scope of the “Basic Features” compared to other RTOs
- Grid West is not first to market
- There are no legislated/mandatory deadlines
- Market design and build are not concurrent
- Vendor market place is smaller, but still hungry

Avoiding Costs

Key Considerations

Background

The Numbers

Operating Expenses

Startup Costs

Avoiding Costs

The following key considerations are worth noting to minimize the start-up, re-design, and O&M costs of Grid West:

- **Build and Design Timing** – Completing the market design or re-design prior to the build phases will result in lower start-up/re-design costs.
- **Build and Regulatory Approval** – Minimizing spending on systems before major regulatory hurdles have been cleared will likely reduce costs.
- **Contract Terms** - Creating the proper incentives and risk sharing mechanisms will mitigate startup costs/risks. Change management processes can manage risk and cost tremendously
- **System Flexibility** – Implementing systems that are flexible to change and are not reliant on a single vendor will reduce re-design costs.
- **Costs of changing market functionality** – Do the cost benefit before making a market design change.
- **Leverage other markets functionality when regional differences don't come into play** – if it can be re-used, costs will be reduced.
- **IT leading edge** – avoid paying for vendor development.

Some key cost sensitivities are...

Cost Driver	Description
Labor	Every 25 additional FTEs adds \$3.4 million to the annual operating expenses
Implementation	Every 30 days of delay adds: <ul style="list-style-type: none"> • \$4m to pre-operational labor and outside services costs at time of peak loading
Interest Rate	A 1% change in interest rates adds: <ul style="list-style-type: none"> • \$2.4 million to start-up costs • \$1.4 million to annual operating expenses
Amortization Period	Changing the amortization period to 5 years adds \$13.3 million to the revenue requirement for the first five years
Annual Operating Expenses	Every \$10m in operating expenses adds \$0.03 to unit cost (\$/MWh).