

**MISO Regional and National Transmission Projects**


MREC Conference  
March 3, 2016




**MISO Overview - Who We Are**

- Midcontinent Independent System Operator (MISO)
- Independent, non-profit organization responsible for maintaining reliable transmission of power in 15 states and one Canadian province
- First Regional Transmission Organization (RTO) approved by the Federal Energy Regulatory Commission (FERC)


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**MISO Overview – ISO-RTO Map**

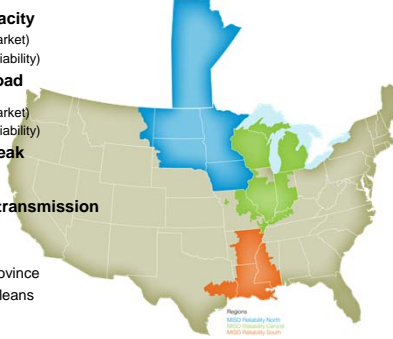


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**MISO Overview – Scope of Operations**

- **Generation Capacity**
  - 178,808 MW (market)
  - 189,390 MW (reliability)
- **Historic Peak Load (July 20, 2011)**
  - 127,125 MW (market)
  - 131,181 MW (reliability)
- **Historic Wind Peak (January 27, 2016)**
  - 12,720 MW
- **65,800 miles of transmission**
- **Footprint**
  - 15 States
  - 1 Canadian Province
  - City of New Orleans




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**MISO Overview – What We Do**

- Monitor energy transfers on the high voltage transmission system
- Schedule transmission service
- Manage power congestion through security-constrained economic dispatch
- Operate day-ahead and real-time energy and operating reserves markets
- Regional transmission planning

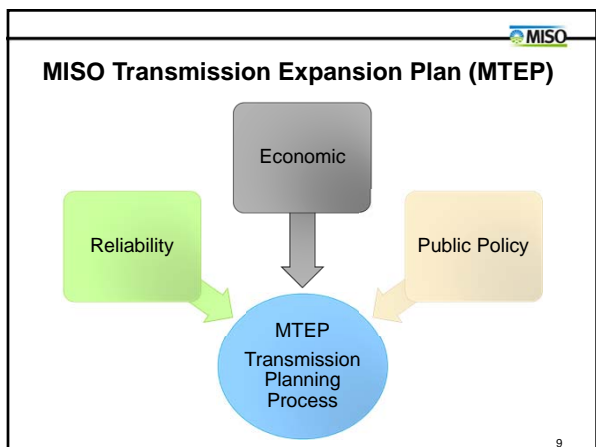
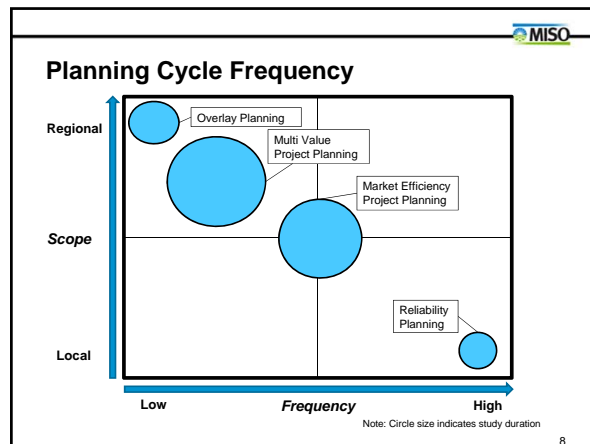
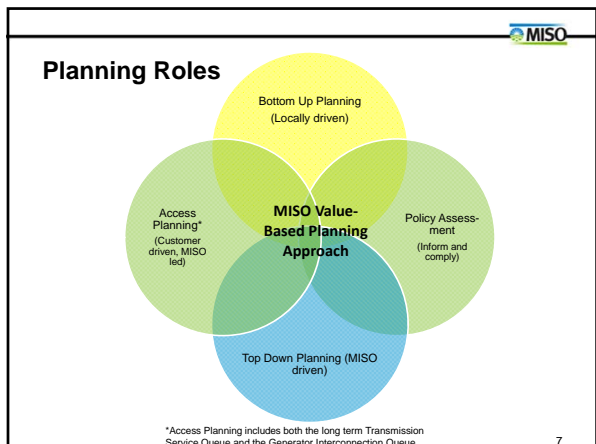
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**MISO Overview – What We Do**

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- **Regional transmission planning**

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### Reliability Planning

**What is Reliability Planning?**

- Reliability assessment and coordination for Transmission Planners within MISO and across the Planning Coordinators

**How? MISO Functions in Four types of Studies/Roles**

- NERC Transmission Planning
- Generation Retirement or Suspension Studies
- Access Planning
- Transmission Service Requests
- Generator Interconnection

**Key Responsibilities**

- MISO
- Stakeholders

### Reliability Planning

**FERC Regional Planning Role**

- Coordinate with TOs to support TO obligations under Transmission Owner's Agreement
- Participate
- Provide necessary data
- Follow through
- Information exchange milestones
- Transparent Sub-Regional forums
- Technical Study Groups as needed
- Order 890 and 1000 Planning Efforts

**NERC Planning Coordinator Role**

- Applicable Standards: TPLs, FACs, MODs, and NUC
- Models, Studies, Implementation

### Economic Planning

**What is Economic Planning?**

- Transmission evaluation based on market economics

**How?**

- MISO Value-Based Planning
- Market Congestion Planning Studies
- Targeted Initiatives

**Key Responsibilities**

- MISO
- Stakeholders

### Economic Planning

- MCPS: Market Efficiency Project (MEP)
- 28.5 mi of single circuit 345 kV and Duff/Coleman sub upgrades (MISO)
- 14 mi double circuit and two Rockport 765/345 transformers (PJM)
- MISO portion recommended as MISO
  - B/C ratio: 16.1
  - Estimated cost: \$67.2M
- First project eligible for TDQS
- Regionally Cost Shared

### Public Policy

What is Public Policy Requirement?

- Integrating Public Policy in the most cost effective and reliable manner

How?

- Value-Based Planning that meet public policy standards
  - MTEP Futures
  - Targeted Initiatives

Key Responsibilities

- Regulators
- MISO
- Stakeholders

### Multi-Value Project (MVP) Portfolio

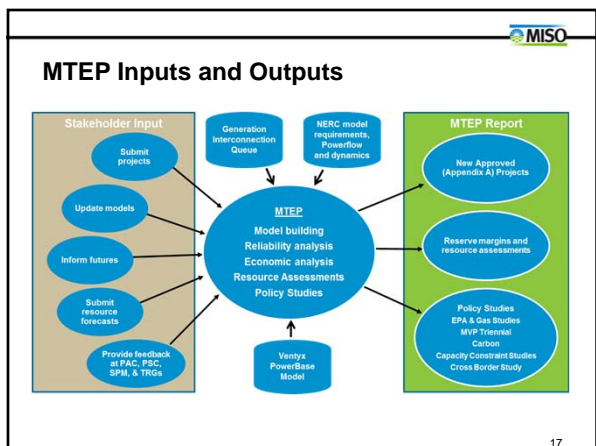
### MVP Portfolio Status Q4 2015

Multi-Value Project Status as of Q4 2015

MVP No.	Project Name	State	Estimated to Service Date <sup>1</sup>		Status		Cost <sup>2</sup>		
			Letter Approved	Q4 2015	Letter Approved	Construction	Letter Approved	Q4 2015	
1	Big Stone-Brookings	SD	2017	2017	●	Pending	226.7	226.7	
2	Brookings, SD-SE Twin Cities	MN/SD	2011-2011	2013-2015	●	Complete	738.4	670.7	
3	Lakeland Int. - Winnebago-Winco-Burt area & Sheldon-Burt Area-Walsh	MN/IA	2015-2015	2016-2018	●	Underway	550.4	541.1	
4	Winco-Lime Creek Emery Black Hawk-Hazleton	IA	2015	2015-2018	●	Underway	468.6	454.3	
5	N LaCrosse-N. Madison-Carroll (a/k/a Badger-Couler Project) & Carroll-Holbrook Creek	WI/IA	2014-2018	2018-2020	●	Pending	787.5	1014.0	
6	Big Stone South - Ellendale	ND/SD	2019	2019	●	Pending	330.7	195.7	
7	Dittuma-Zachary	IA/MO	2017-2020	2017-2019	●	Pending	152.3	119.9	
8	Zachary-Marysvet	IA	2018-2018	2015-2019	●	Pending	112.8	113.4	
9	Merced-Holmes-Meredith-Iowa & Meredith-Austin	ND/IL	2018-2011	2015-2017	●	Underway	401.2	705.4	
10	Austin-Pana	IL	2018	2018-2018	●	Pending	99.4	135.5	
11	Pana-Paradee-Kansas-Sugar Creek	IL/IN	2018-2015	2016-2018	●	Underway	318.4	438.4	
12	Merced-Burt-Dea-Hugh	IN	2019	2019	●	Underway	271.0	271.0	
13	Michigan-Thruway-Louis-Transmission	MI	2013-2015	2015-2015	●	Complete	500.0	500.0	
14	Neversville-Greentown	IN	2018	2018	●	Pending	245.0	187.5	
15	Peasant Prairie-Zion Energy Center	WI	2014	2013	●	Complete	28.8	31.0	
16	Vargo-Sandburg-Oak Grove	IL	2014-2015	2010-2018	●	Pending	199.0	239.3	
17	System-Wiring	IL	2016	2016	●	Underway	61.7	89.8	
							<b>Total</b>	<b>5,584</b>	<b>6,469</b>

● Pending  
● In regulatory process or partially complete  
● Regulatory process complete or the regulatory process requirements

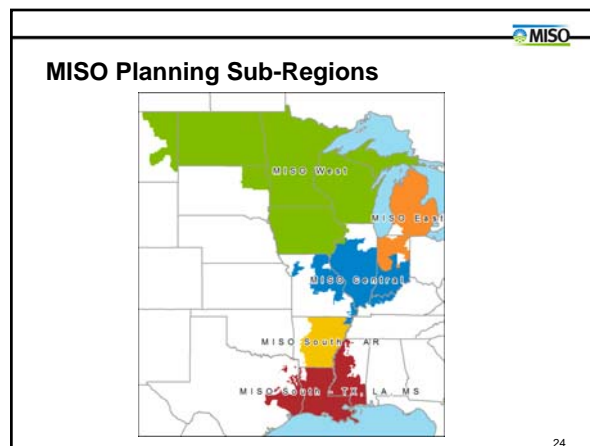
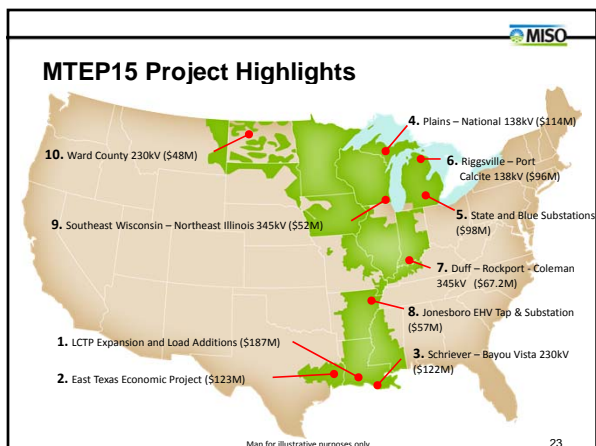
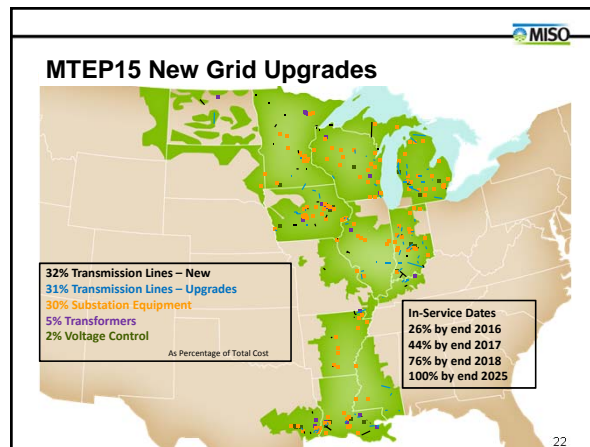
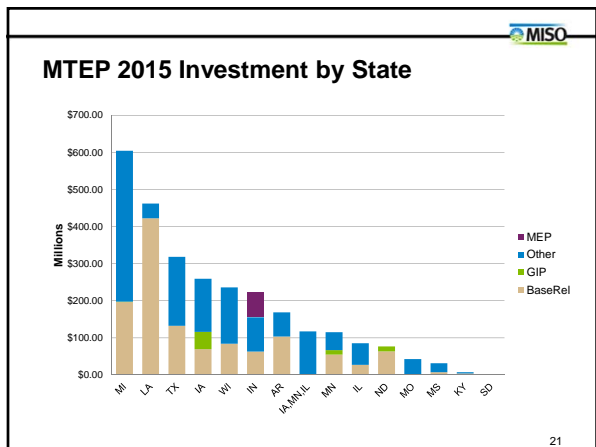
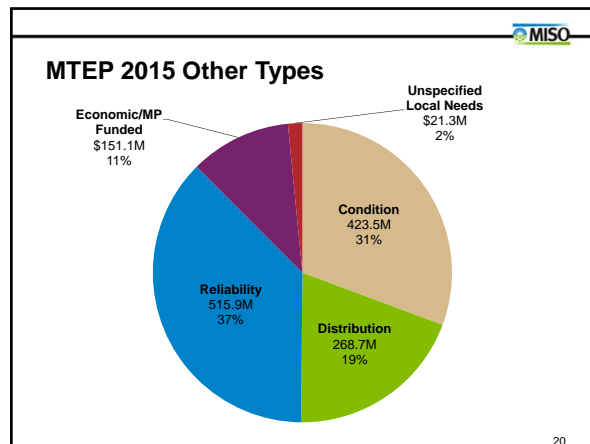
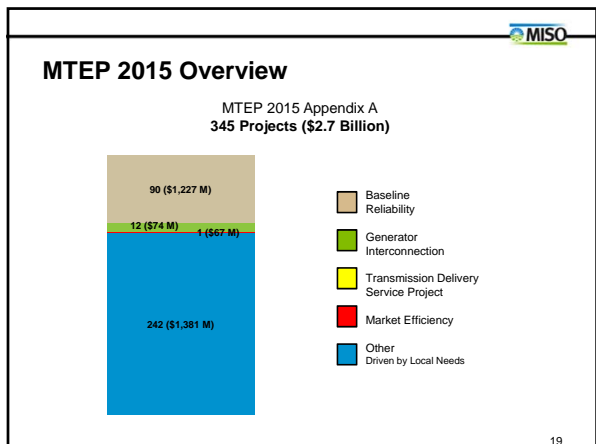
<sup>1</sup> Estimates provided by constructing Transmission Owners. Costs stated in millions of nominal dollars.

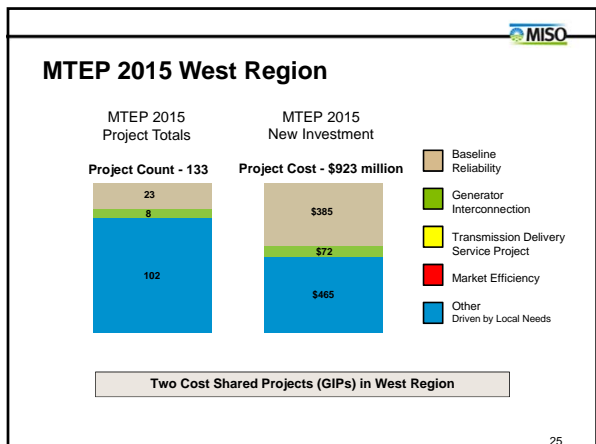


### MTEP Project Types

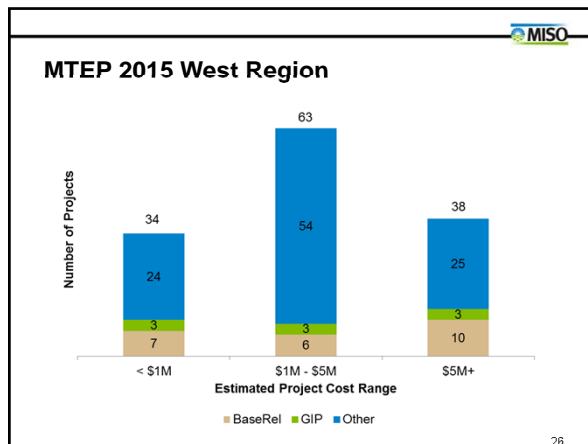
- Multi-Value Project (MVP)** (Regional)
  - Provide regional public policy economic and/or reliability benefits.
- Market Efficiency Project (MEP)** (Regional)
  - Provide significant reductions in market congestion.
- Transmission Delivery Service Projects (TDSP)** (Externally Driven)
  - Required to satisfy a Transmission Service request.
- Generation Interconnection Projects (GIP)** (Externally Driven)
  - Upgrades that ensure the reliability of the system when new generators interconnect.
- Baseline Reliability Projects (BRP)** (Bottom-Up)
  - Transmission projects required to meet NERC reliability standards.
  - Represent the minimum standard applied across the MISO footprint.
- Participant Funded ("Other")** (Bottom-Up)
  - A project not meeting any of these classifications is designated as "Other."
  - Includes required projects that are not part of the bulk electric system under MISO functional control.

■ Bottom-Up ■ Top-Down ■ Externally Driven

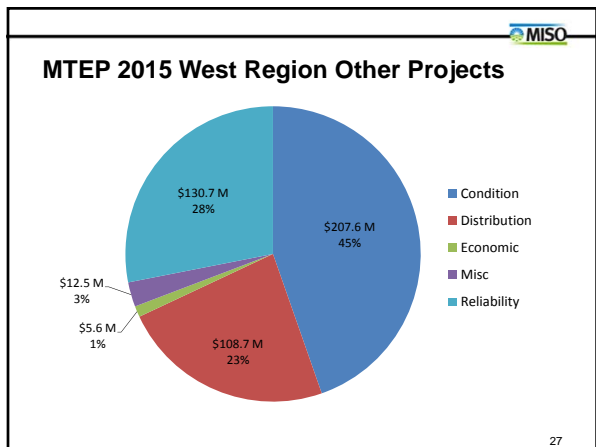




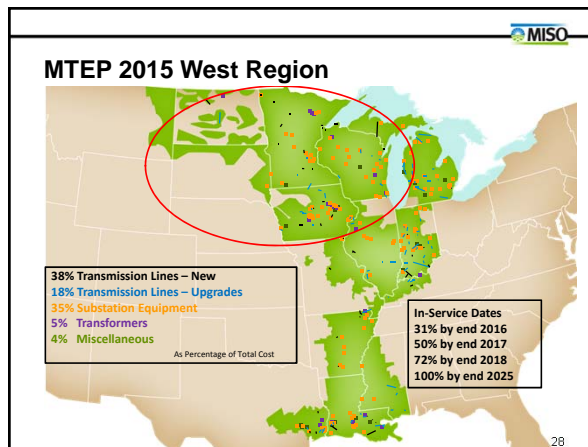
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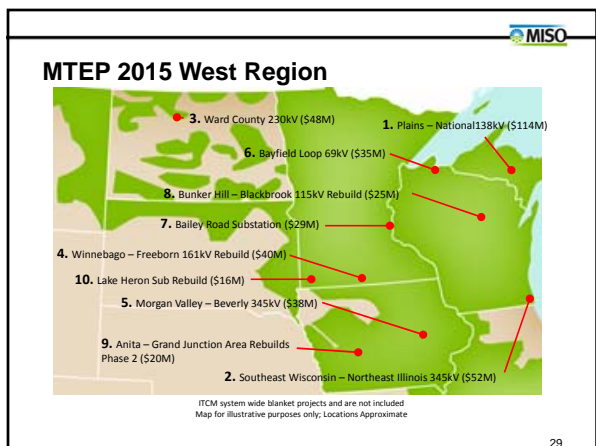
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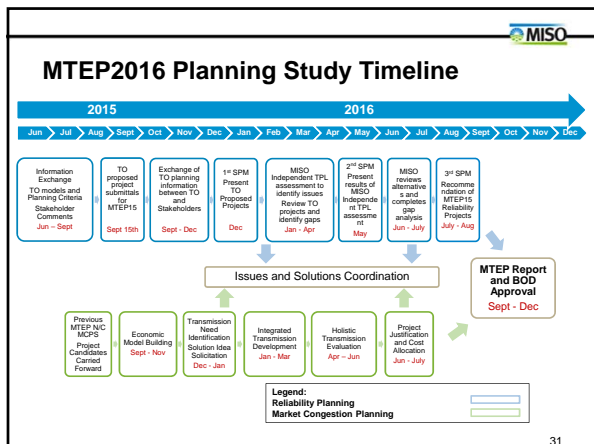
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- ### MTEP 2016 Future Projects
- MTEP16 Reliability and Economic Studies Underway
  - New bottom-up projects for MTEP16 submitted 3Q 2015
    - 328 New Projects across MISO footprint
    - 138 Projects in MISO West
  - Sub-Regional Planning Meetings to be held in May and July
  - MISO Board of Directors to review MTEP16 in December 2016

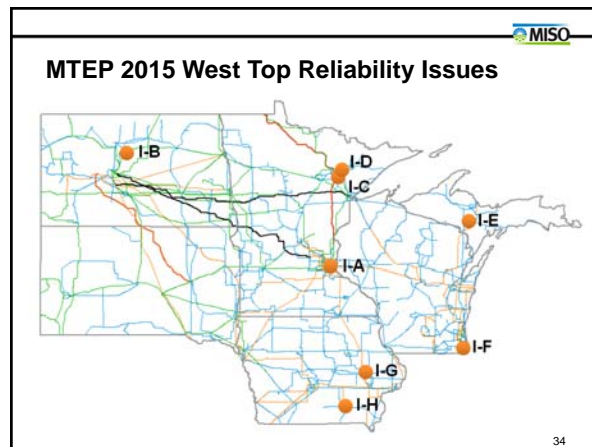
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### Contact Information

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### Appendix



### West Region MTEP 2015 Project Highlights

Rank	Project Description	Org	ID	Cost	Type	Driver
1	Plains – National 138kV	ATC	8071	\$114M	BaseRel	Reliability
2	Southeast Wisconsin – Northeast Illinois 345kV	ATC	8065	\$52M	BaseRel	System Reliability
3	Ward County 230kV	XEL	8113	\$48M	BaseRel	Reliability – Thermal overloads and low voltages
4	Winnebago – Freeborn 161kV Rebuild	ITCM	8156	\$41M	GIP	Interconnection studies identified necessary upgrade
5	Morgan Valley – Beverly 345kV	ITCM	8160	\$38M	BaseRel	Reliability – Serving large load
6	Bayfield Loop 69kV	XEL	8149	\$36M	Other	Load serving limitations
7	Bailey Road Substation	XEL	8780	\$29M	BaseRel	Reliability – Thermal Overloads
8	Bunker Hill – Blackbrook 115kV Rebuild	ATC	7603	\$25M	BaseRel	Reliability – Asset Renewal
9	Anita – Grand Junction Area Rebuilds Phase 2	ITCM	8128	\$21M	Other	Age and Condition
10	ITCM Heron Lake Sub Rebuild and 161kV Cap	ITCM	8106	\$17M	Other	Load Serving Reliability

ITCM system wide blanket projects and are not included

### Planning Models

Application	Also referred to as	Use
Steady-State	Powerflow, PSS/E, TARA, POM	Reliability
Dynamic Stability	Dynamics (PSS/E, TSAT)	Reliability
Voltage Stability	Voltage Stability (PSS/E, VSAT)	Reliability
Transfer Analysis	Transfer Analysis (PSS/MUST, TARA)	Reliability
Production Cost	PROMOD and PLEXOS	Economic, Public Policy
Regional Resource Forecast	EGEAS	Economic, Public Policy