Florida Public Service Commission Rule Development Workshop

Integration of Renewables into the Planning Process

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1) Overview of Integrated Resource Planning (IRP)

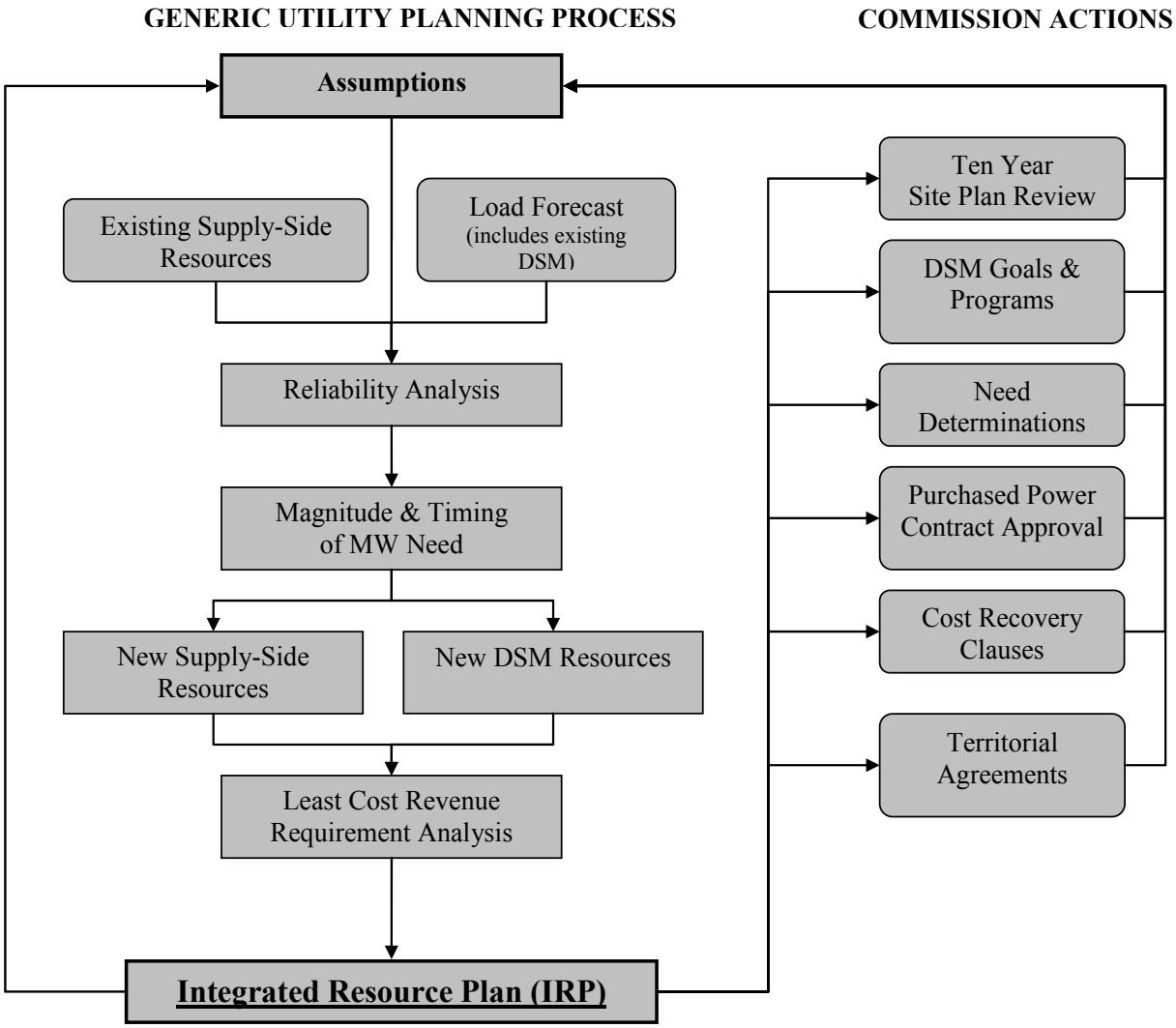
2) Alternative Renewable Portfolio Standard (RPS) Rollout Strategies

Overview of
Integrated Resource Planning (IRP)

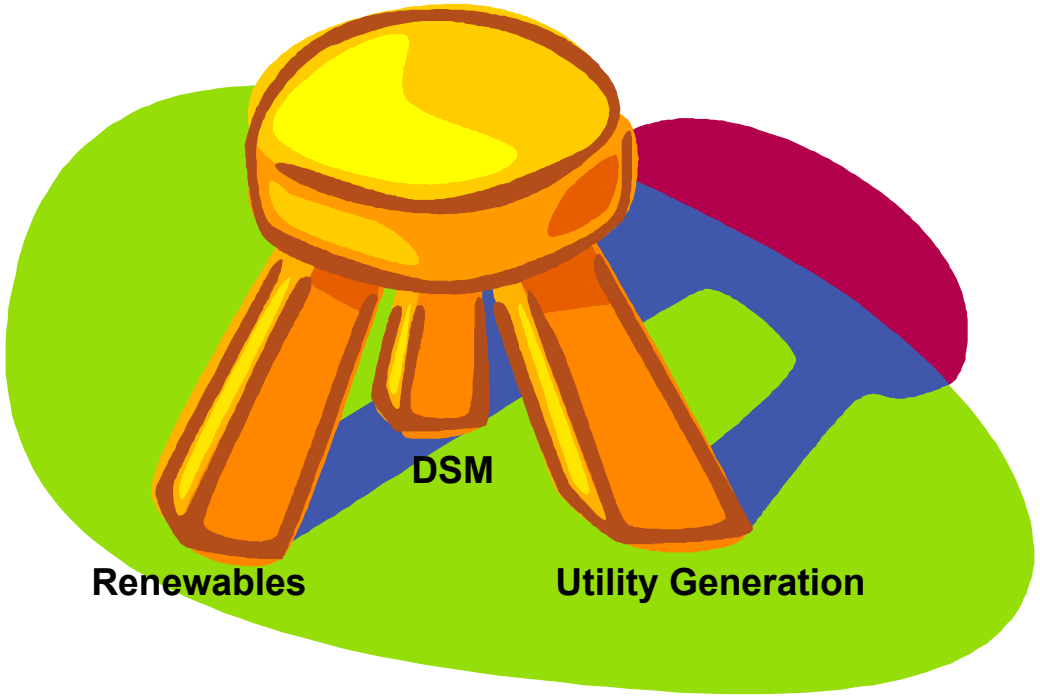
Overview of IRP

- An IRP process incorporates both conservation (demand-side) and generation (supply-side) resources to achieve a system that provides reliable service at the least cost.
  - Demand-side resources consist of conservation and customer-owned renewable resources.
  - Supply-side resources consist of purchased power from utilities and renewable generators as well as utility-owned generation.

Overview of IRP



IRP is Like a Three Legged Stool



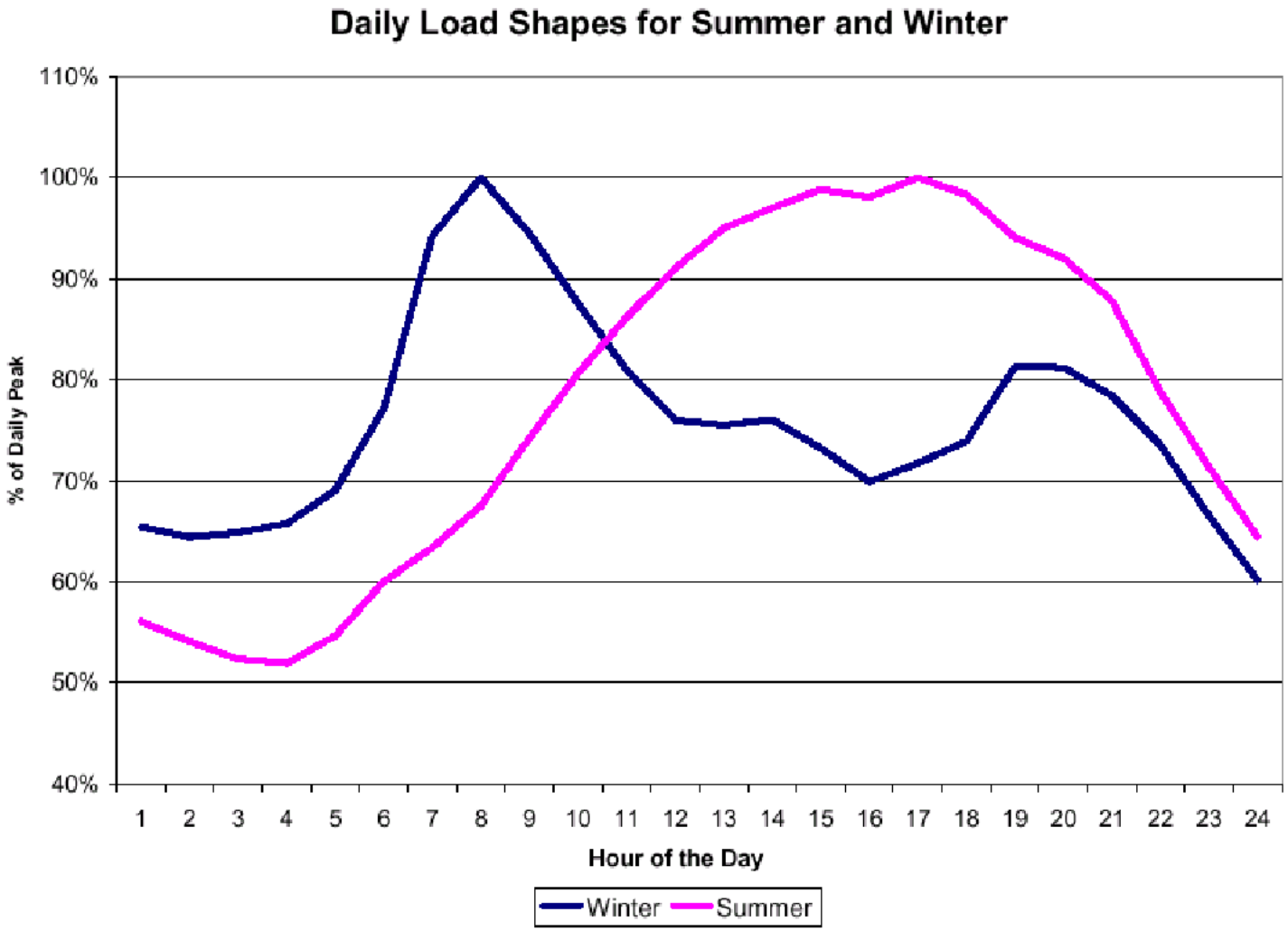
- Both DSM and renewable generation are socially desirable alternatives to utility generation.
- Utilities should seek a balanced approach to DSM, renewables and utility generation.

Overview of IRP

- Peak Demand
  - Instantaneous measurement of load.
  - Determines TIMING and SIZE of new unit.

- Net Energy for Load (NEL)
  - Accumulation of demand over period of time.
  - Determines TYPE of new unit.

Overview of IRP



Overview of IRP

- **Utility must plan to serve all customers.**
  - Even with slowing economy, new people arrive in Florida each day.
- **Utility must plan to serve total load.**
  - Average house size has increased approximately 30% since 1986.
- **Utility demand-side management programs can influence customer usage.**
  - The less customers require in kW and kWh, the less a utility will be required to build and operate.

Overview of IRP

- FEECA requires the PSC to adopt goals that will:

  1) conserve expensive resources, like petroleum fuels,

  2) reduce and control the growth rates of electricity consumption,

  3) reduce the growth rate of weather-sensitive peak demand, and

  4) encourage the development of demand-side renewable energy systems.

- Authorizes the PSC to require each utility to develop plans and implement cost-effective programs to meet goals.

Overview of IRP

- Once reliability need is identified, the next step is to select the most economic combination of resources to keep the lights on.

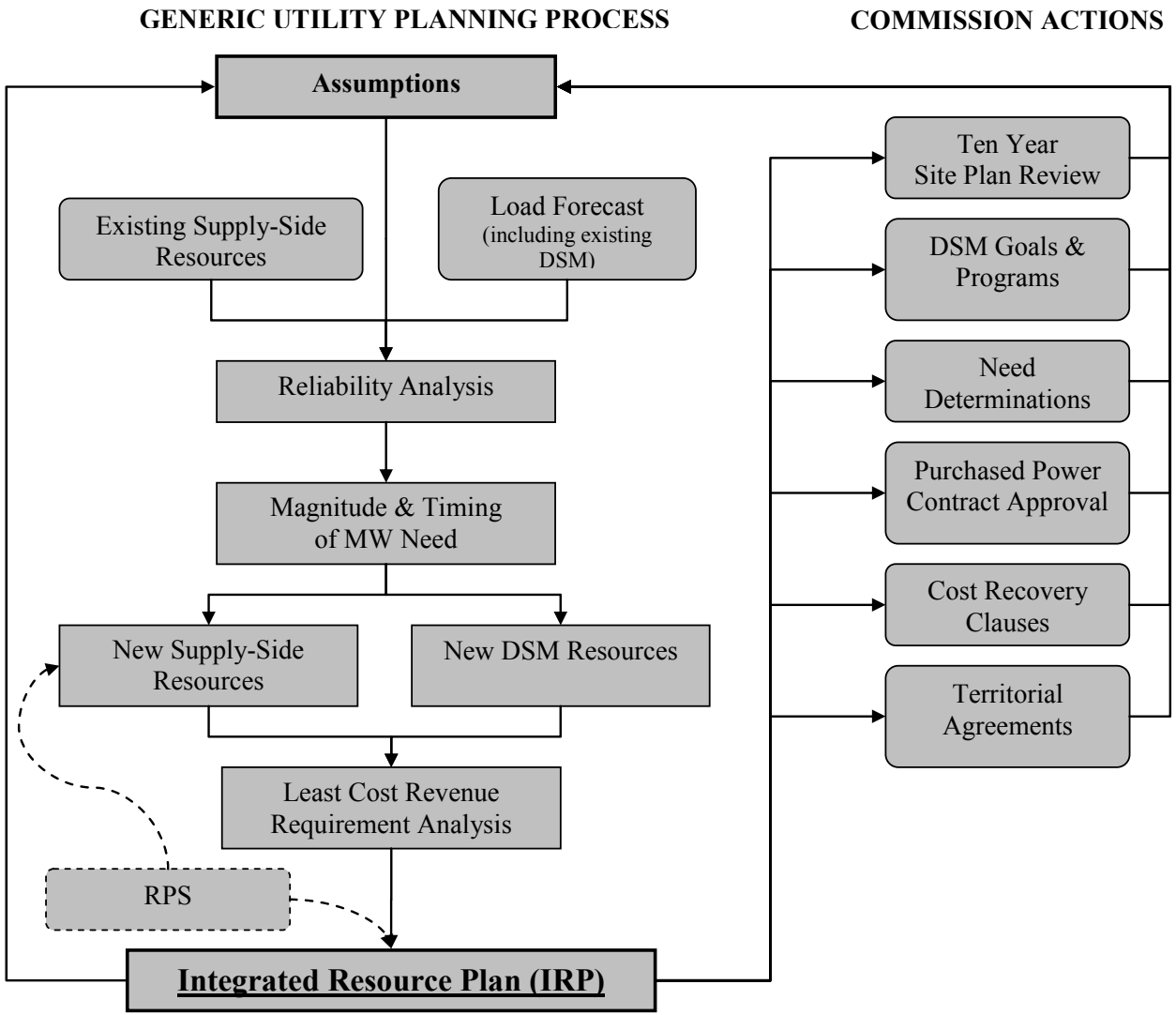
- Capital Costs + O & M Costs + Fuel Costs equals total cost over the life of resource.

- Utility selects a mix of resources that minimize total costs and meet reliability criteria:
  - Demand-side resources
  - Purchased Power (utility, cogen and renewables)
  - Utility generation

Overview of IRP

- Strategic considerations:
  - Fuel diversity
  - Economic development
  - Environmental impacts
- Typically addressed through sensitivity studies.

Overview of IRP



Alternative
Renewable Portfolio Standard (RPS) Rollout Strategies

Alternative RPS Rollout Strategies

- Case A – 20% RPS by 2020
- Case B – 20% RPS by 2030
- Case C – 20% RPS by 2041
- Case D – “Clean Energy Portfolio”

Alternative RPS Rollout Strategies

2007 Existing Renewable Generation		
	Capacity (MW)	**Generation (GWH)**
Class I (Solar and Wind)	3	2
Class II (All others)	1,069	6,337
TOTAL	1,072	6,339
Retail Sales by 4 IOUs		175,751
% of Retail Sales		**3.6%**

- Many values provided based on calculations, not measured data.
- Values include firm sales, non-firm sales, and self-service generation.

Alternative RPS Rollout Strategies

- Levelized costs per RPS data request.
- Class I Resources
  - Solar PV – Rooftop (New Home Construction)
  - $196 / MWh
- Class II Resources
  - Florida Crystals – New Biomass Plant
  - $120 / MWh

Alternative RPS Rollout Strategies

100 % Solar			
	Case A	**Case B**	**Case C**
RPS Value (GWh)	44,500	28,000	21,600
Required Capacity (MW)	26,000	16,500	12,760
Existing Capacity (MW)	3	3	3
# of Installations by 2020	5.8 Million	3.6 Million	2.8 Million
Estimated Cost ($Billion NPV)	$34.6	$24.2	$20.2

Note: For comparison purposes, all values are as of 2020.

Case A – 20% RPS by 2020, Case B – 20% RPS by 2030, and Case C – 20% RPS by 2041.

Alternative RPS Rollout Strategies

100 % Biomass			
	Case A	**Case B**	**Case C**
RPS Value (GWh)	44,500	28,000	21,600
Required Capacity (MW)	6,350	4,000	3,100
Existing Capacity (MW)	1,069	1,069	1,069
# of Installations by 2020	66	37	25
Estimated Cost ($Billion NPV)	$21.2	$14.8	$12.4

Note: For comparison purposes, all values are as of 2020.

Case A – 20% RPS by 2020, Case B – 20% RPS by 2030, and Case C – 20% RPS by 2041.

Alternative RPS Rollout Strategies

25% Solar/ 75% Biomass			
	Case A	**Case B**	**Case C**
RPS Value (GWh)	44,500	28,000	21,600
Required Solar Capacity (MW)	5,770	3,630	2,800
Existing Solar Capacity (MW)	3	3	3
# of Solar Installations by 2020	1.4 Million	0.9 Million	0.7 Million
Required Biomass Capacity (MW)	4,760	3,000	2,300
Existing Biomass Capacity (MW)	1,069	1,069	1,069
# of Biomass Installations by 2020	46	24	15
Estimated Cost ($Billion NPV)	$24.5	$17.2	$14.3

Note: For comparison purposes, all values are as of 2020.

Case A – 20% RPS by 2020, Case B – 20% RPS by 2030, and Case C – 20% RPS by 2041.

Alternative RPS Rollout Strategies

Estimates of % Revenue Cap Required									
	Case A			Case B			Case C		
	All Solar	All Biomass	25/75 Split	All Solar	All Biomass	25/75 Split	All Solar	All Biomass	25/75 Split
2008	4%	1.5%	2%	4%	1.5%	2%	4%	1.5%	2%
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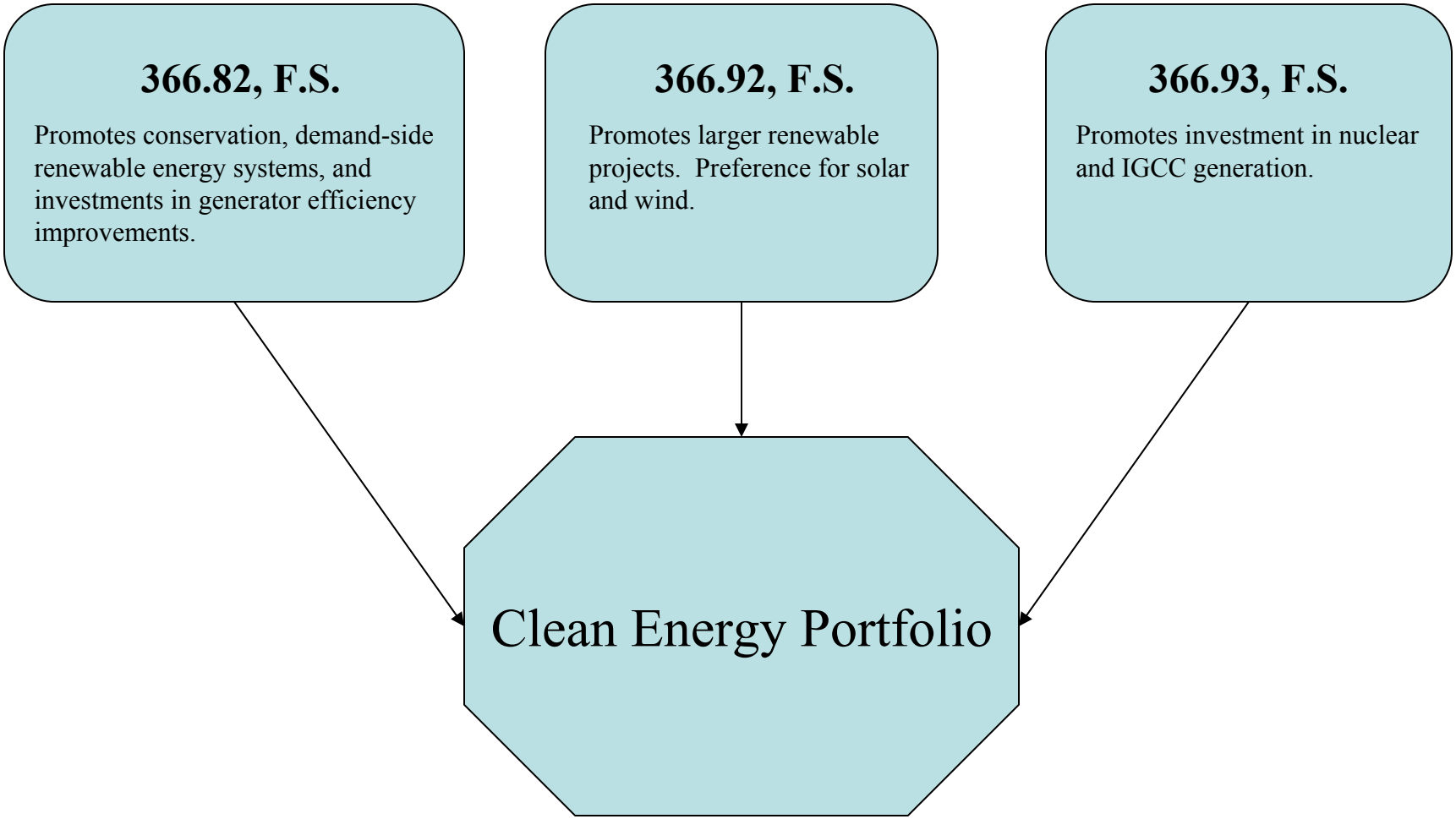
2020	21%	6.5%	10%	13%	4%	6%	10%	3%	5%

Note: Case A – 20% RPS by 2020, Case B – 20% RPS by 2030, and Case C – 20% RPS by 2041.

“Clean Energy Portfolio”



"Clean Energy Portfolio"

% Generation by Resource Type in 2017				
	DSM	**Renewable**	**Nuclear**	**TOTAL**
FPL	3.8	0.9	16.8	21.5
PEF	2.2	3.4	34.6	40.2
TECO	2.6	2.0	0.0	4.6
GULF	5.0	0.3	0.0	5.3
TOTAL	**3.4**	**1.6**	**18.2**	**23.1**

- Based on 2008 TYSP data.
- Includes only firm renewable purchases.
- Does not include RPS, new DSM goals, or FPL's nuclear units.

Note: Generator efficiency improvements measured by changes in system heat rates. FPL projects that recent approvals of Riviera and Canaveral projects will improve system heat rate by 3-4%. Similar data not available for other utilities.