



DTE Energy®

Integrated Resource Planning Stakeholder Engagement Workshop

Workshop #3

November 12, 2018

Conference call kick-off

Call logistics

- Roll call
- After the roll call all participants will be put on listen only mode for the duration of the call
- Questions can be submitted during the course of the presentation (details on next slide)

The purpose of today's teleconference

- As we continue to perform modeling of the scenarios and various sensitivities we would like to provide some additional context on the models being utilized
- Solicit questions and feedback regarding the DTE stakeholder engagement process to date

Instructions to submit questions and comments

- Text DTECOMMENTS to 37607 to join the *Poll Everywhere* session
- Then text ([your name & affiliation](#))
- Text questions or comments as they arise during the presentation. (Please limit questions and comments to 1 per text)
- If using laptop or tablet you may log in using <https://pollev.com/dtecomments> (Please limit questions and comments to 1 at a time)
- We will do our best to answer clarifying questions during the presentation; other questions will be answered at the end of the presentation as time allows
- We will keep the *Poll Everywhere* software open for 30 minutes following the call (until 2:30 PM) to submit questions and comments
- Responses to questions will be sent to RSVPed emails following the conference call



Presentation agenda

- **Models used in the IRP Process**
- Market Valuation Overview
- Strategist Optimization Overview
- Summary of Stakeholder Engagement to Date

Glossary



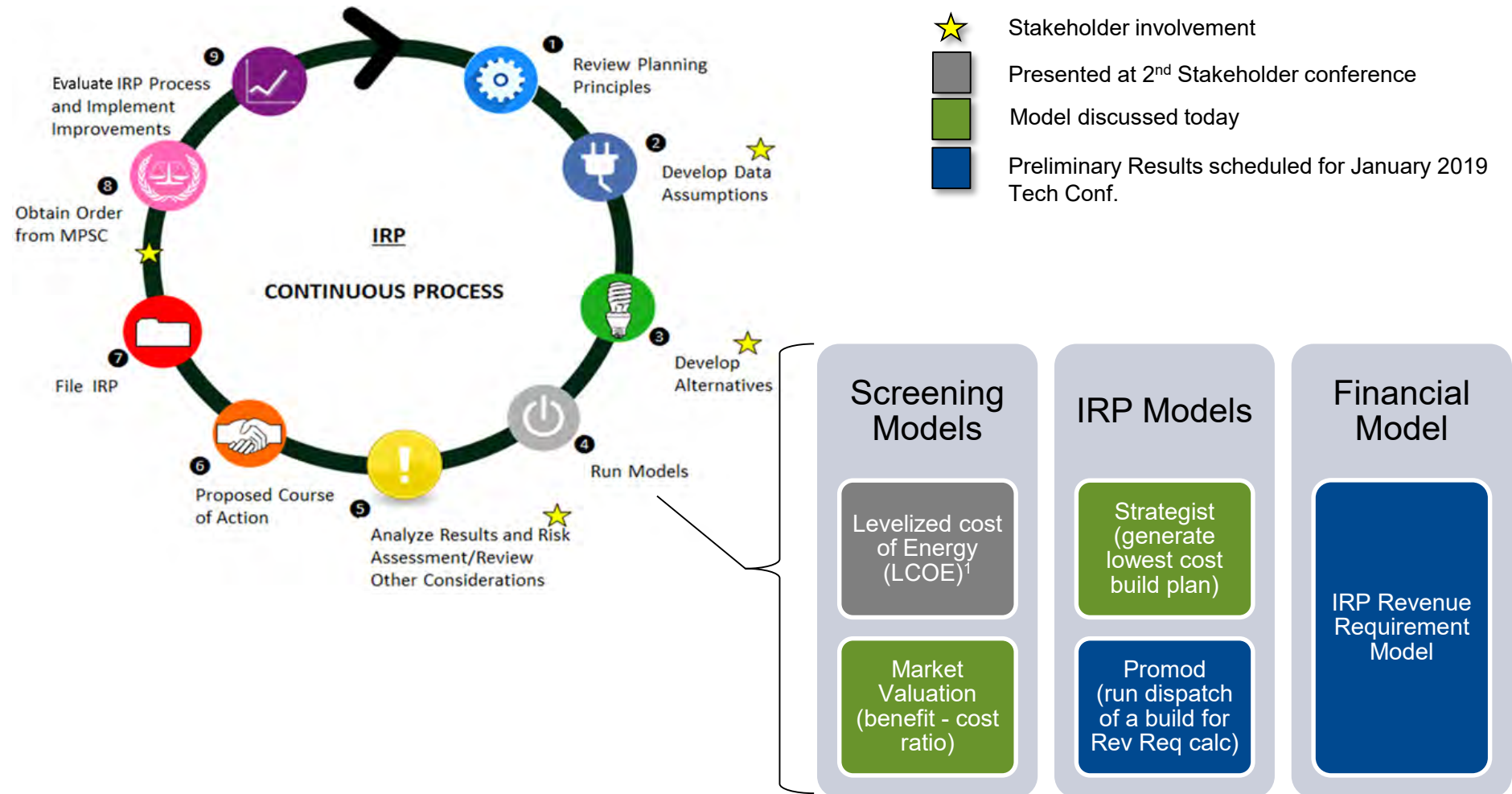
LCOE : Levelized cost of energy (\$/MWh)

LCOC : Levelized cost of capacity (\$/KW)

Market Valuation: An analysis to determine the value of each asset or IRP alternative in each different Market scenario performed using the Strategist model

B/C Ratio: Output of the Market Valuation. Benefit divided by cost. This ratio represents a numerical value that can be used to compare a range of alternatives across various scenarios

The modeling process for the IRP is underway



Each tool used in the IRP process has a different level of detail when considering the impacts of an alternative



	LCOE	LCOC	Market Valuation	Strategist Optimization	Financial Model
Capital Investment	✗	✗	✗	✗	✗
Fixed O&M	✗	✗	✗	✗	✗
Variable Costs (fuel, emission, O&M)	✗		✗	✗	✗
Economic Dispatch			✗	✗	✗
Market Volatility			✗ ¹	✗ ¹	✗ ²
Startup Costs					✗
Compliance targets				✗	✗
Energy Benefit			✗	✗	✗
Capacity Benefit			✗	✗	✗
Net Present Value Revenue Requirement				✗	✗
Annual Rev Requirement Profile					✗
Rate impact					✗

✗ Accounted for in Model

Strategist

Strategist -
Proview

Strategist - GAF
or PROMOD

1) Strategist - Typical Week (2,016 Hours)

2) PROMOD - 8,760 Hours

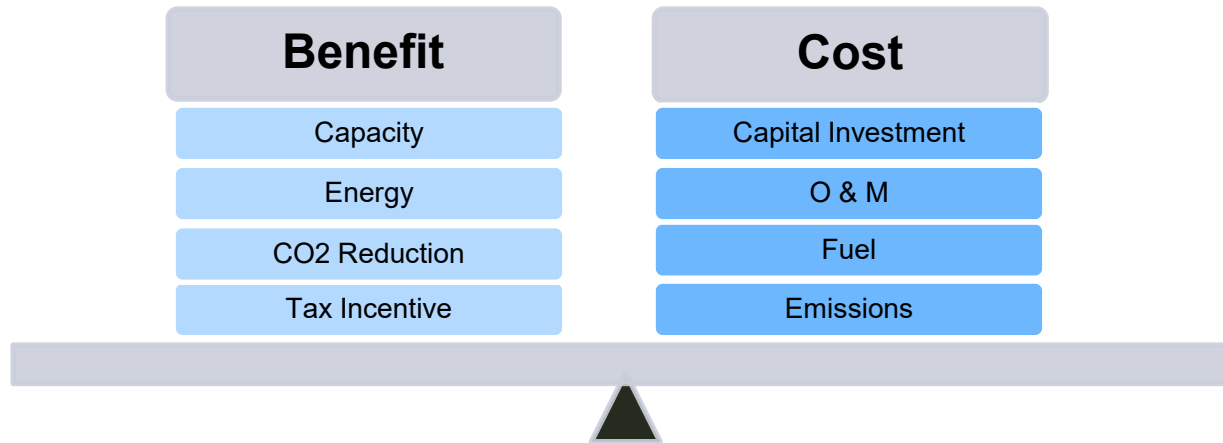
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To narrow down the options in Strategist, we incorporate a Market Valuation or Benefit-Cost (B/C) Analysis into our screening process



Market Valuation Analysis



B/C Ratio > 1 = Benefit is greater than the cost

B/C Ratio < 1 = Cost is greater than the benefit

A market valuation summary is a useful tool understand how the benefit of an alternative changes relative to others across multiple scenarios



Market Valuation Summary from 2017 IRP Report

To be used for discussion purposes only and do not reflect current results

		Reference	High Gas	Market valuation to be run across each scenario
NATURAL GAS	1 x 1 H Class CCGT	0.85	0.91	
	2x 1 H Class CCGT	0.92	0.93	1
	3x 1 H Class CCGT	0.95	0.94	2
	2 x 1 F Class CCGT	0.87	0.90	
	Frame 7 CT	0.74	0.75	
RENEWABLE	Solar	0.59	0.69	3
	Wind	0.75	0.88-1.05 ¹	4
	Lithium Ion Battery	0.26	0.19	5
DEMAND RESPONSE	Behavioral	0.69	0.42	
	Thermostat	0.79	0.40	6
	BYO Thermostat	0.73	0.37	

¹Based on capacity factors ranging from 35%-41%.

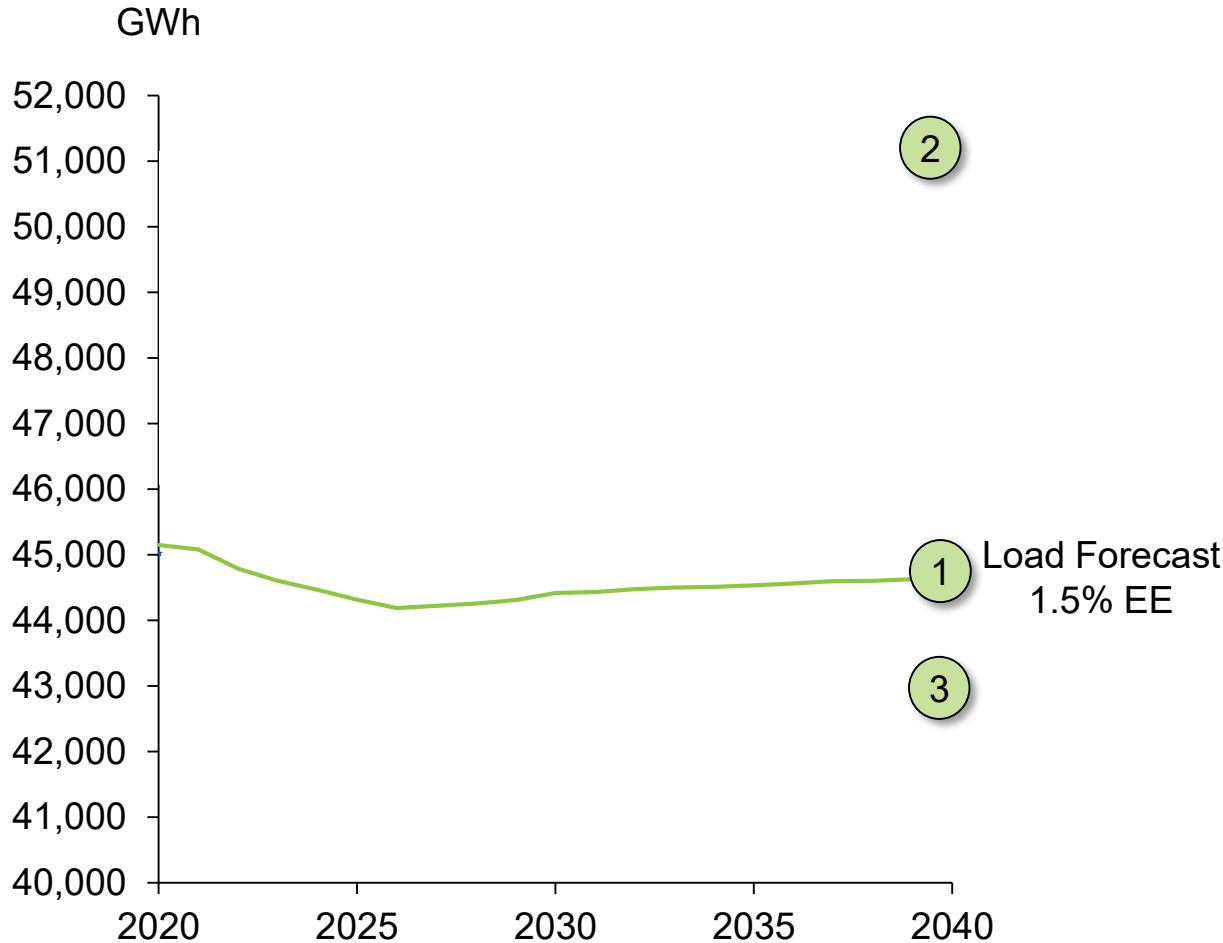
How to interpret the change in Benefit/Cost Ratio across scenarios:

- 1 Intuitively, an increase in gas price will lower the market value of a CCGT. A high gas price has a direct impact to power prices and the power to replace a CCGT is at a higher price
- 2 There are capital and operation efficiency benefits for larger thermal units
- 3 Improvement in solar B/C ratio from Reference case results from higher market price in High Gas scenario
- 4 The magnitude change of wind is greater than solar as a result of a higher wind capacity factor
- 5 Decrease in B/C ratio results from change in spread of on and off peak power prices
- 6 DR value is in capacity only. Reduction in B/C ratio is the result of a lower capacity market

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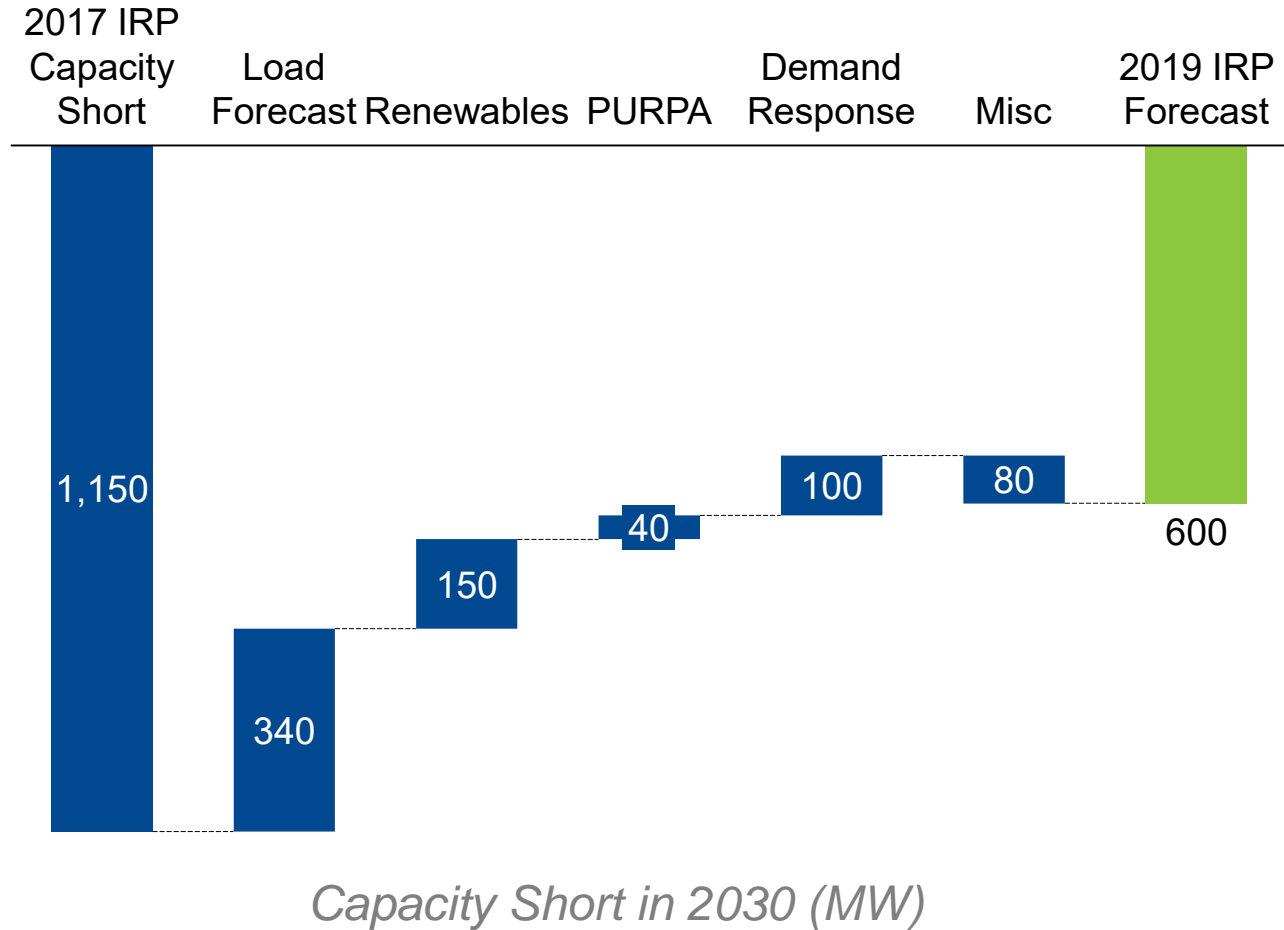
The program savings and associated spend for every level of energy efficiency is maintained through 2040



- 1 The demand forecast has 1.5% EE embedded in the load projection.
- 2 EE zero is modeled in PROMOD/Strategist and adds back the 1.5% EE base energy savings. A program spend is not applied to EE Zero
- 3 The total of 2% EE energy savings is modeled. The net effect of the EE zero sale and 2% EE savings. The total program spend is modeled for this program (not the incremental cost)

Note: EE programs assume a measure life that corresponds with the end-use lives in the EE potential Study

DTE does not expect to have a capacity need until 2030, the addition of DR and renewable projects are helping drive down DTE's capacity need in that year



Alternatives evaluated to fill capacity short

- Wind
- Solar
- Combustion Turbine
- Combined Cycle
- Energy Efficiency
- Demand Response
- Energy Storage

1. Unit UCAP and Planning Reserve Margin Changes
 2. Based on Michigan potential study, includes 115 MW of conservative voltage reduction
 3. 25% renewable energy by 2030

4. Placeholder for 2030 replacement was a 1,000MW 2x1 CCGT

An output report of a Strategist optimization is a summary that ranks plans by least cost



PROVIEW Output File from 2017 IRP

To be used for discussion purposes only and do not reflect current results

PLAN RANK	2	1	2	3	4	5
2016	IACB(1) EEB (1) EEZ (1) DEF(92)	IACB(1) EEB (1) EEZ (1) DEF(92)	IACB(1) EEB (1) EEZ (1) DEF(92)	IACB(1) EEB (1) EEZ (1) DEF(92)	IACB(1) EEB (1) EEZ (1) DEF(92)	IACB(1) EEB (1) EEZ (1) DEF(92)
2017						
2018						
2019						
2020						
2021						
2022	H3X1(1) H31D(1)	7HA2(1) H21D(1) DEF(245)	H3X1(1) H31D(1)	F7CT(1) DEF(250) H3X1(1) H31D(1)	H3X1(1) H31D(1)	
2023						
2024		DEF(289)				
2025		DEF(252)				
2026		DEF(248)				
2027		DEF(231)				
2028		DEF(215)				
2029	DEF(176)	7HA2(1) H21D(1) DEF(160)	DEF(176)			DEF(176)
2030	7HA1(1) H11D(1) DEF(158)		F7CT(1) S30 (1) DEF(239)	F7CT(1) DEF(228)	F7CT(1) W30 (1) DEF(291)	
2031	DEF(146)	DEF(148)	DEF(227)	DEF(216)	DEF(279)	
2032	DEF(120)	DEF(121)	DEF(201)	DEF(189)	DEF(253)	
2033	DEF(111)	DEF(112)	DEF(191)	DEF(180)	DEF(243)	
2034	DEF(92)	DEF(94)	DEF(173)	DEF(162)	DEF(225)	
2035	DEF(71)	DEF(72)	DEF(151)	DEF(140)	DEF(203)	
2036	DEF(47)	DEF(49)	DEF(128)	DEF(117)	DEF(180)	
2037	DEF(19)	DEF(21)	DEF(100)	DEF(89)	DEF(152)	
2038			DEF(71)	DEF(60)	DEF(124)	
2039			DEF(75)	DEF(64)	DEF(127)	
2040			DEF(77)	DEF(66)	DEF(129)	
P.V. UTILITY COST						
PLANNING PERIOD	15732856.0	15768014.0	15783295.0	15794394.0	15799462.0	
% DIFFERENCE	0.00%	0.22%	0.32%	0.39%	0.42%	

- 1 A legend will be provided that details each alternative in the Strategist. (EE Zero and EE base both are in run and is described in a previous slide)
- 2 An output of a PROVIEW optimization is a plan summary that ranks plans meeting the forecasted capacity need by least cost
- 3 PV utility cost is calculated for each plan of an optimization. The numbers shown represents the total system costs for the fleet which can be compared against other plans (cost in \$K). Plan #2 has a NPV of \$35M more than plan #1 in this example.
- 4 DEF represents capacity purchase. When no DEF is shown, the plan has long capacity position.
- 5 When DEF is displayed, capacity purchase is required. DEF (289) = 289 MW of capacity is purchased in 2024. In this example, the available capacity purchase is 300 MW, every plan will have a capacity purchase below that amount
- 6 The number next to an alternative indicates the number of alternatives selected. If two of the same alternative is selected, F7CT (2) will be shown.

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Numbers used for example purposes only
Presented 11/12/18

The least cost plan is not always the plan selected due to application of the Planning Principles



Plan 1








- 1.5% EE
- **1,500 MW** CCGT in 2022
- **500 MW** CCGT in 2029

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Plan 2

- 1.5% EE
- **1,000 MW** CCGT in 2022
- **1,000 MW** CCGT in 2029
- **\$35M NPV** higher than plan #1

DTE Planning Principles

- RELIABILITY 
- AFFORDABILITY 
- CLEAN 
- FLEXIBLE AND BALANCED 
- COMPLIANT 
- REASONABLE RISK 
- COMMUNITY IMPACT 

Plan #1	Plan #2
Same	
Better long term	Better Short term
	Better short term
More sales	Better balance
Same	
Higher reliance on sales	Lower risk
Same	

Presentation agenda

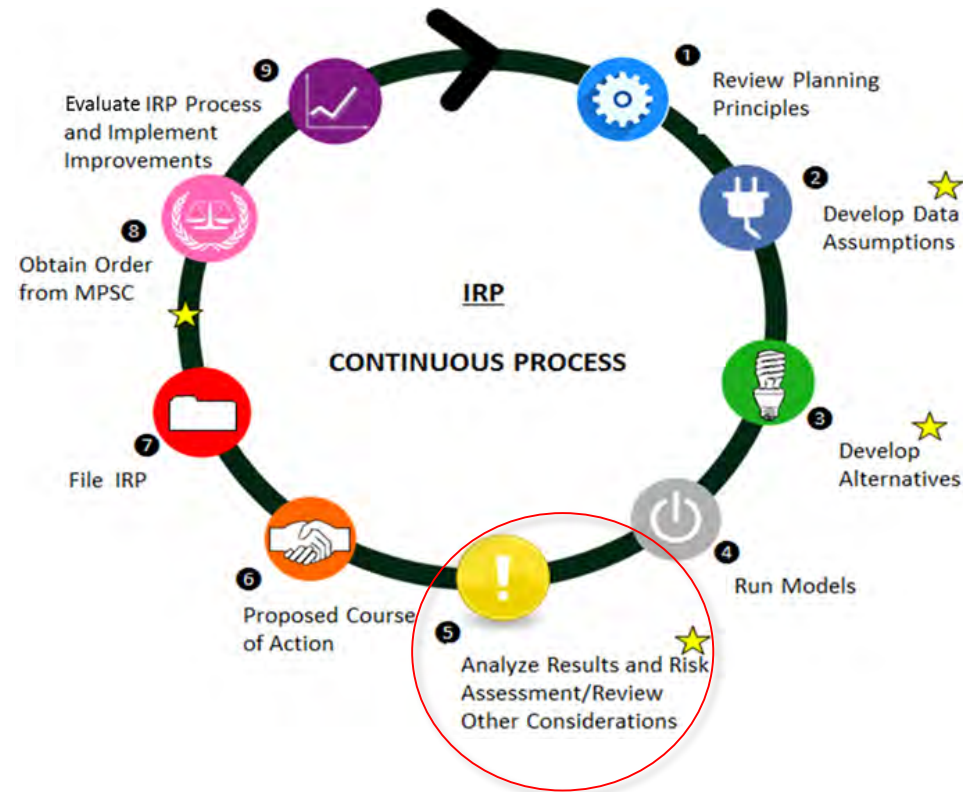
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We have continued to make improvements and incorporate feedback throughout the stakeholder engagement process



	Technical Workshops	IRP Open Houses	Blue Water Energy Center Open House
Dates and Location	<ul style="list-style-type: none"> 6/11: DTE Huron Renewable Energy Center, Bad Axe 9/27: DTE Headquarters, Detroit 11/12: Conference Call January: Details TBD 	<ul style="list-style-type: none"> 7/26: WCCC, Taylor 8/16: Schoolcraft Community College, Livonia 10/23: WCCC Downtown District, Detroit 	<ul style="list-style-type: none"> 9/25: Marine City High School
Attendees	<ul style="list-style-type: none"> Total of 34 attendees for the first two technical workshops 19 unique entities 	<ul style="list-style-type: none"> Total of 130 attendees across all three open houses 	<ul style="list-style-type: none"> Total of 195 attendees
Feedback and Improvements	<ul style="list-style-type: none"> Added two additional workshops based on feedback Utilized electronic polling for ease of collecting questions and comments 	<ul style="list-style-type: none"> Utilized email account to receive electronic comments based on feedback Posted open house materials on the Empowering MI blog site Established third open house in Detroit based on feedback and staffed with language interpreters Used social media to communicate 2nd and 3rd open houses 	<ul style="list-style-type: none"> Positive and supportive of the BWEC plant

Q&A / Closing



- By the January Technical Workshop, we anticipate showing preliminary modeling results for the Majority of Sensitivities and Scenarios
- If you have feedback on how the Stakeholder Process has gone so far, please submit comments through the PollEverywhere
- We will keep the PollEverywhere open for another 30 minutes to collect all the questions remaining
- We anticipate providing written answers to the questions in a week or so