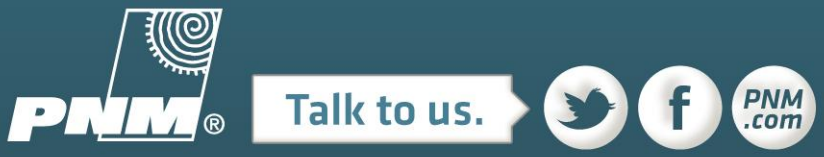
PNM 2014-2033 Integrated Resource Plan

JANUARY 27, 2014



AGENDA

JANUARY 27TH

Today's agenda

- Welcome, Introductions, Safety and Ground Rules
- Advanced Technology Presentation
- High and Low Load Forecast Scenarios
- Discuss Schedule & Plan Future Meetings

Handout: Typical week load shapes illustrating impact of wind and solar resources

SAFETY AND LOGISTICS

- Fire escape routes via stairways at east and west ends of hallway; please let us know if you require special handicap egress or special assistance
- We must obey any fire or emergency alarm; even drills/test alarms
- Restrooms – Women's room at west end; Men's room at east end
- Must sign in and sign out with security desk each time you enter the building
- Recycling – please help our efforts by dropping plastic or aluminum containers in the designated recycle bins

MEETING GROUND RULES

- Questions and comments are welcome; please be mindful of our time constraints
- Comments should be respectful of all participants
- Use name tents to indicate you have a comment or question
- Reminder: today's presentation is not PNM's plan or a financial forecast, it is an illustration of the IRP modeling process

DISCLOSURE REGARDING FORWARD LOOKING STATEMENTS

The information provided in this presentation contains scenario planning assumptions to assist in the Integrated Resource Plan public process and should not be considered statements of the company's actual plans. Any assumptions and projections contained in the presentation are subject to a variety of risks, uncertainties and other factors, most of which are beyond the company's control, and many of which could have a significant impact on the company's ultimate conclusions and plans. For further discussion of these and other important factors, please refer to reports filed with the Securities and Exchange Commission. The reports are available online at www.pnmresources.com.

The information in this presentation is based on the best available information at the time of preparation. The company undertakes no obligation to update any forward-looking statement or statements to reflect events or circumstances that occur after the date on which such statement is made or to reflect the occurrence of unanticipated events, except to the extent the events or circumstances constitute material changes in the Integrated Resource Plan that are required to be reported to the New Mexico Public Regulation Commission (NMPRC) pursuant to Rule 17.7.4 New Mexico Administrative Code (NMAC).

Brian Arellano

PNM Generation Planning & Development Dept.

Advanced Energy Technology
Project Manager

EMERGING TECHNOLOGY AND POTENTIAL EFFECTS

AGENDA

SMART GRID & TECHNOLOGY DEVELOPMENT CYCLE

Trend for adopting new technologies:

1. Identify Technology function and benefits
2. Identify impacts of technology
3. Cost Effective

Solar Technology

Smart Inverters

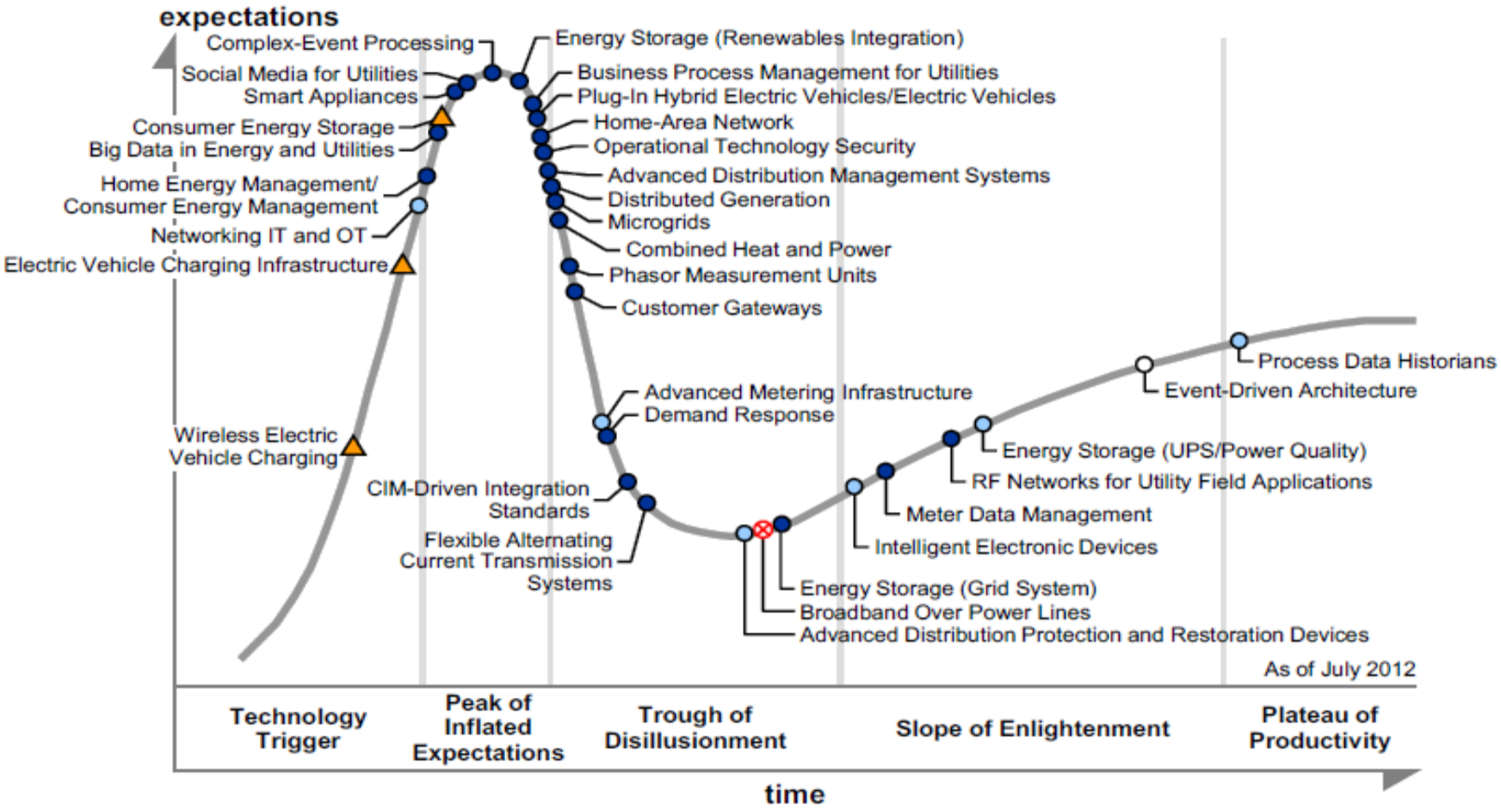
Electric Vehicles

Energy Storage

MicroGrid

Small modular nuclear

SMART GRID & TECHNOLOGY
BIGGER PICTURE



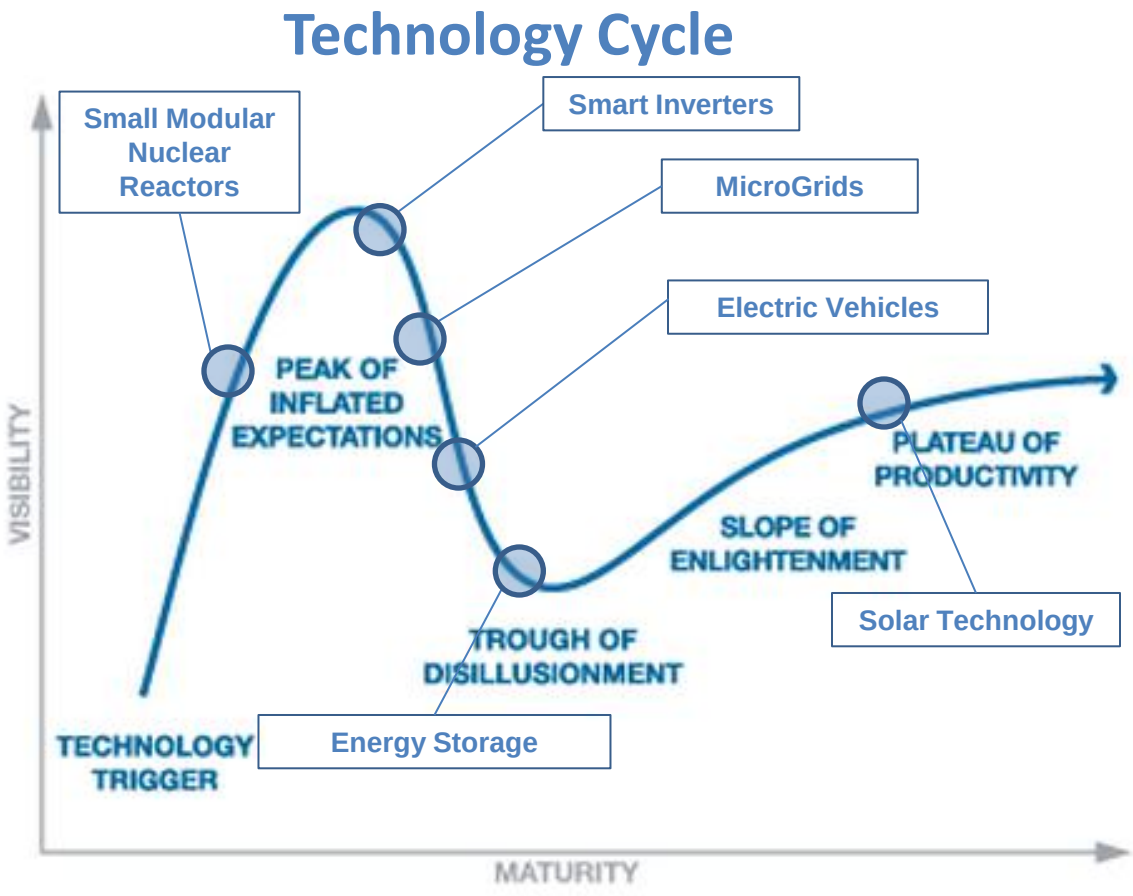
Source: Gartner (July 2012)

SMART GRID & TECHNOLOGY

Smart Grid - What is it?

An overlaying of computing and communications technology on the electric grid.

Enables increased capability of other technologies



SOLAR

What is it?

Solar is the sunlight converted to power.

Affect on Load curve

Decrease load curve during daylight hours. Can be unpredictable on cloudy days.

Timeline

Currently adopting

Cost

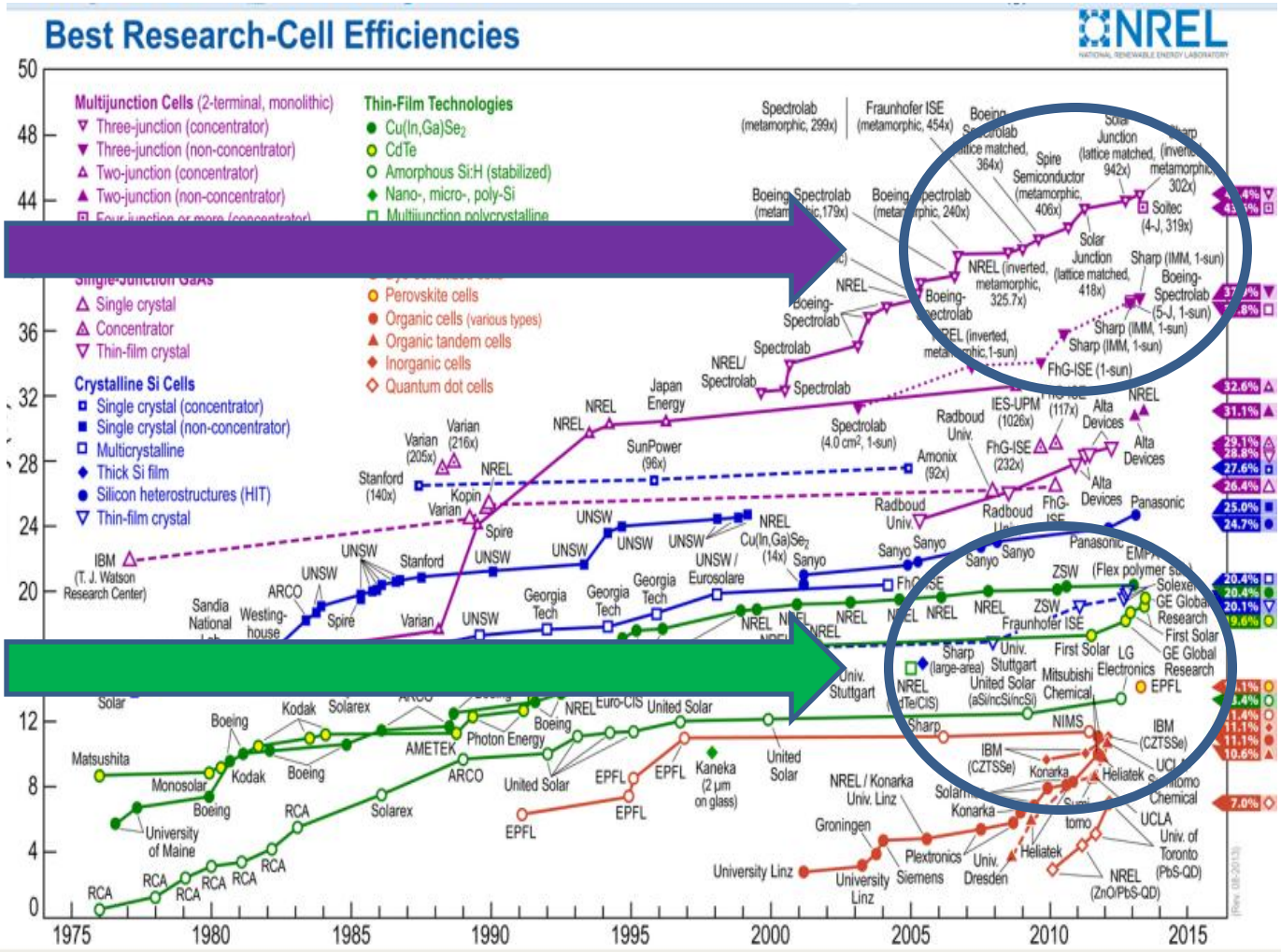
Maturing pricing – in some cases less than 7 cents/KWh for installations.

Costs have been coming down

SOLAR - RAPIDLY MATURING RENEWABLE TECHNOLOGIES

Hi Tech PV approaching theoretical limits close to 50% efficiency

Thin film showing big improvements – which mean a lot to production costs



TYPES OF SOLAR (THERMAL)

What is it? -Solar Energy trapped by solar troughs to produce heat

Power Tower

- Highest land requirement
- High water requirement (cooling)
- Currently lowest cost
- Efficiency – 8 to 22%
- Key issues – cost reductions, scale up

Parabolic Trough

- Most mature technology
- High water requirement (cooling)
- Efficiency – 13.5%
- Key issues – Cost reduction, freeze protection of molten salt

Dish Engine

- Highest Efficiency
- Early technology deployments
- Limited Deployment
- Efficiency – 16 to 30%
- Key issues – Maintenance Costs, variability

SMART INVERTERS

What is it?

Inverters that convert DC from a renewable source to AC to help deal with intermittent generation such as correct voltage and adjustable power factor.

Affect on Load curve

Decrease load curve during daylight hours.

Timeline

3-5 years

Cost

Added cost for a for a residential size inverter is +$150

ELECTRIC VEHICLES

What is it?

Vehicles that use batteries to power (EVs) or supplement the power (PHEV) .

Affect on Load curve

Increase the net system load.

Charging off peak can be utilized to balance system load level.

Vehicle to Grid can act like a generation resource so can also decrease system load for a short time period. This capability is still in early development

Timeline

3-7 years out.

Cost

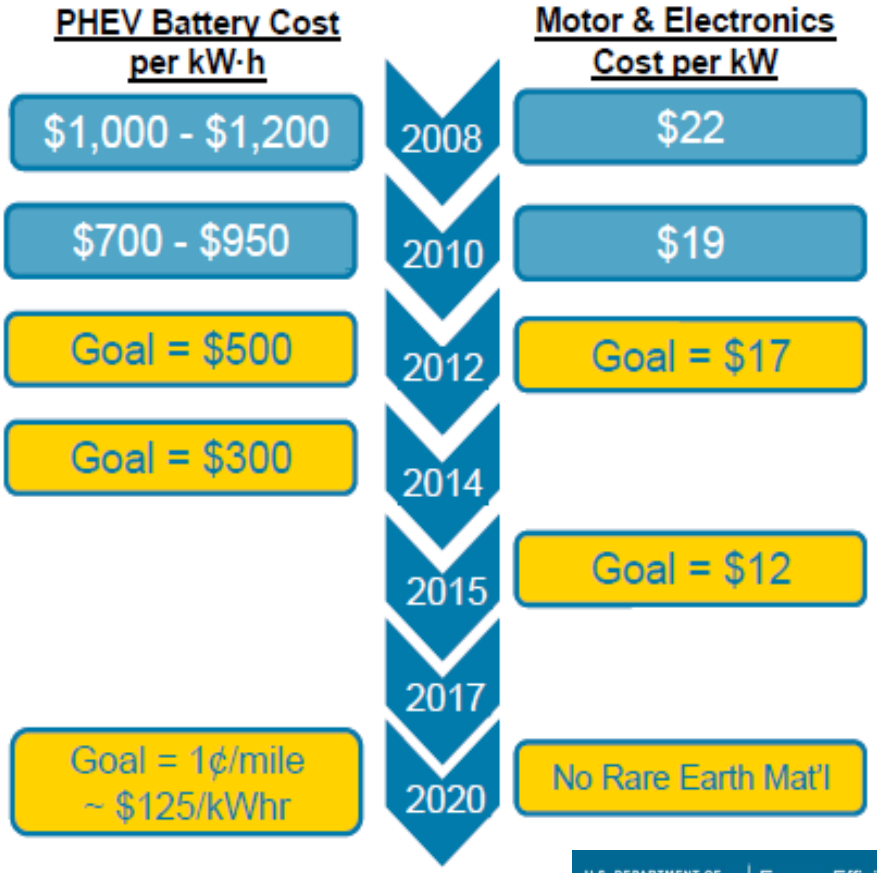
$10k increased cost vs. combustion engine. Currently takes on average 6-7 years to recoup. Costs are coming down

ELECTRIC VEHICLE – TECHNOLOGY COST PROJECTIONS

System cost projections

(eere.energy.gov)

- Battery cost per kWh
  - $1-2K in 2008
  - **$125 in 2020**
- Motor & Electronics cost per kW
  - $22 in 2008
  - **$12** in 2015



U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

ENERGY STORAGE

What is it?

Technology that stores energy in some form such as chemical in the case of batteries, mechanical in the case of fly wheels, or thermal in the case of ice storage, to be used at a later time for either power or energy applications

Affect on Load curve

Can modify load depending on the application.

Timeline

3-10 years out.

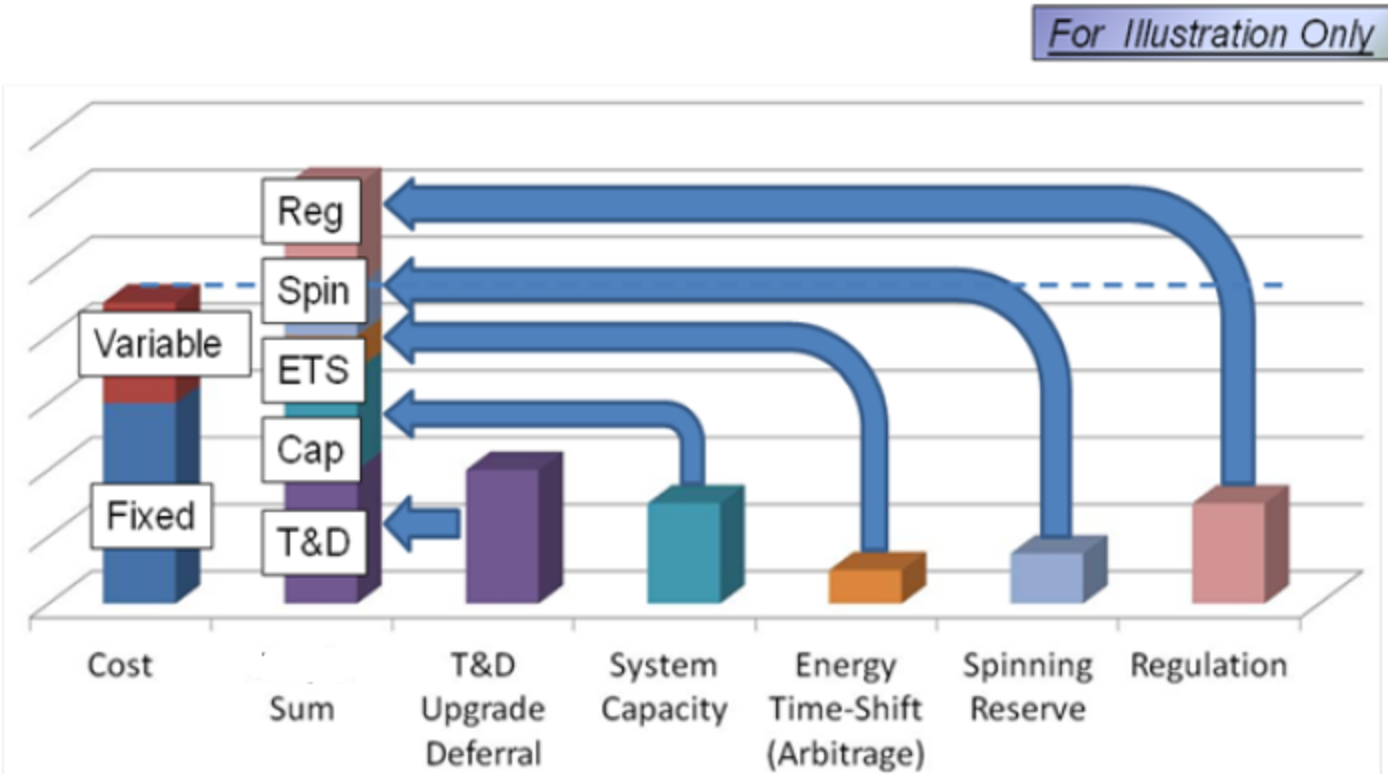
Cost

Demonstration Multiple benefits have to be quantifiable.

In 2013, The California Public Utilities Commission (CPUC) established a target of 1,325MW (over the next 10 years). Current costs are approximately twice as much as they need to be in today's market

STORAGE COST VS. BENEFIT
NEED TO STACK APPLICATIONS/BENEFITS

There are numerous applications for energy storage



MICROGRIDS

What is it?

A system consisting of distributed resources serving one or more customers that can work together in an island connected or detached from the utility grid. Could be a single building (residential, commercial, or even industrial)

Affect on Load curve

Have the ability to change and decrease utility load profile given customers will rely on their own resources.

Technology improvements in generation along with need for new capacity resources enables the rising interest for distributed resources (DR)

Timeline

8-12 years out. The potential expansion of use of micro-grids is directly correlated with the current growth of distributed generation.

Cost

Demonstration projects are between $71M-$100M. R&D is targeting costs and savings of installation to become more feasible

MODULAR NUCLEAR POWER PLANTS

What is it?

The International Atomic Energy Agency (IAEA), defines SMR (Small Modular Reactors) as reactors that produce 300MW or less.

SMR designs are promising as a commercial application to the growing need to reduce fossil fuel based energy.

Affect on Load curve

No effect. New resource to meet demand.

Timeline

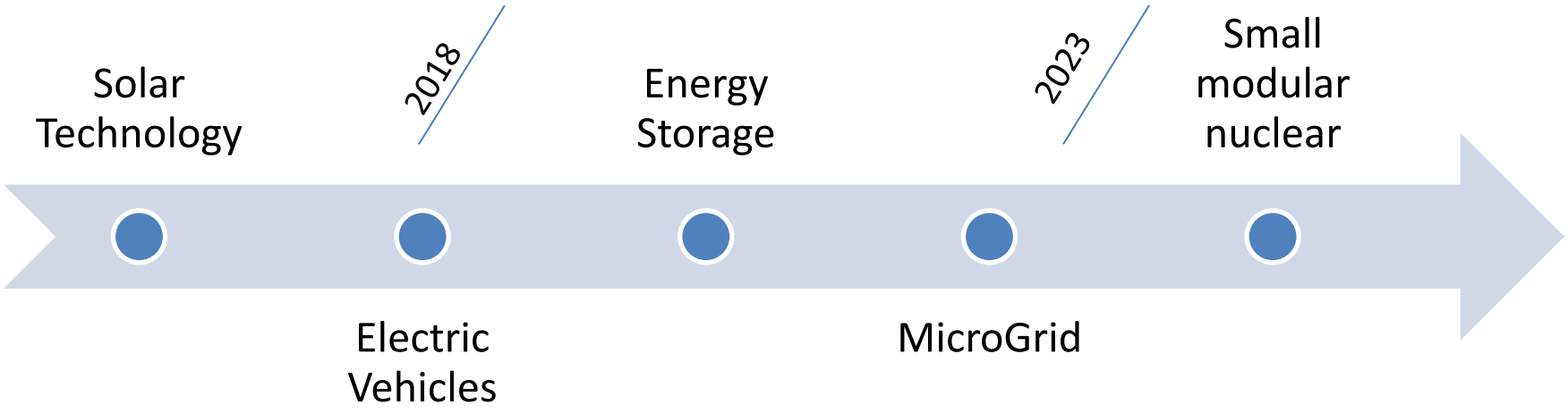
10+ years out

Cost

Target costs are around $80MWh

Although significant potential, designs still need technical and regulatory (NRC) process to ensure safe and secure deployment.

OVERVIEW - TIMELINE



SUMMARY

Smart grid is multiple technologies that go through phases of maturity before adoption in the utility.

Trend for adopting new technologies:

1. Identify Technology function and benefits
2. Identify impacts of technology (example Solar PV Penetration)
3. Cost effective

LOAD FORECAST CURVES FOR IRP

GENERAL LOAD FORECAST ASSUMPTIONS

- Utilizes 10-year weather normalized methodology
- Includes all PNM retail and wholesale customers
- Includes distribution and transmission losses
- Based upon Bureau of Business and Economic Research (“BBER”) July 2013 forecast for economic conditions
- Low, Mid and High created from BBER forecasts
- Low & High adjusted for potential customer or technology impacts for final curves

LOAD FORECAST CURVES FOR IRP

LOAD FORECAST ASSUMPTION DETAILS

- Low-Load Forecast
  - Pessimistic BBER economic condition forecast
  - 0.7% population growth in 2014, grows to 1.0% by 2015 and stabilizes
  - Loss of a large-power customer (~3 MW) every 18 months beginning 2015
- Mid-Load Forecast
  - Baseline BBER economic condition forecast
  - 1.2% population growth in 2014, grows to 1.5% by 2016 and stabilizes
- High-Load Forecast
  - Optimistic BBER economic condition forecast
  - 1.6% population growth in 2014, 1.5% by 2016 and stabilizes
  - New large-power customer (~3 MW) every 18 months beginning 2015

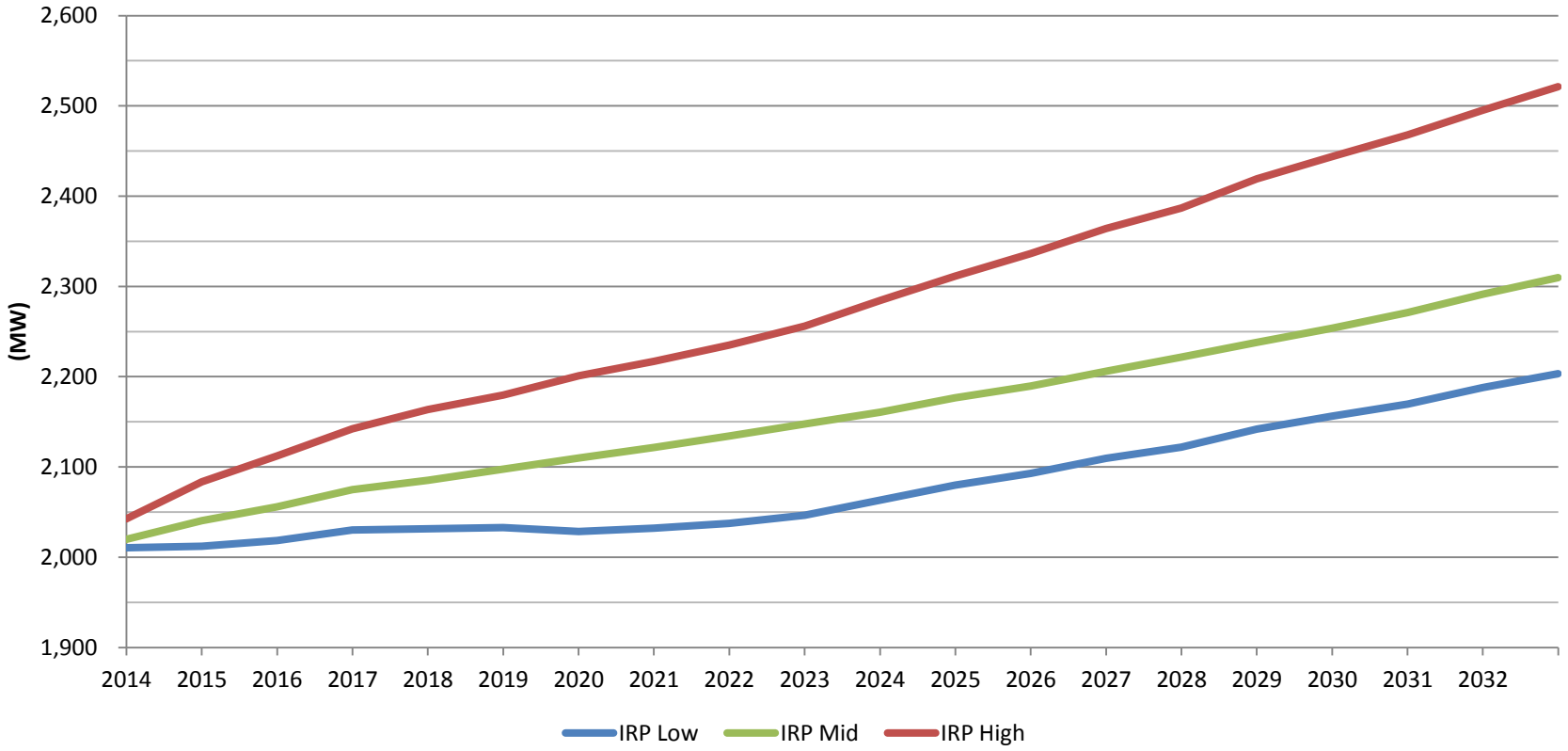
LOAD FORECAST CURVES FOR IRP

LOAD FORECAST ASSUMPTIONS TABLE

Average Annual Growth Rates			
Residential Sector	Low	Mid	High
Use Per Customer	-0.8%	0.02%	0.8%
Energy Sales	-0.4%	0.5%	1.1%
Commercial/Industrial Sectors	Low	Mid	High
Energy Sales	0.5%	0.5%	0.8%
Total PNM	Low	Mid	High
Energy Sales	0.04%	0.4%	0.8%
Demand	Low	Mid	High
System Peak Demand	0.0%	0.0%	0.0%

LOAD FORECAST CURVES FOR IRP

LOAD FORECAST ASSUMPTIONS GRAPH – PEAK DEMAND

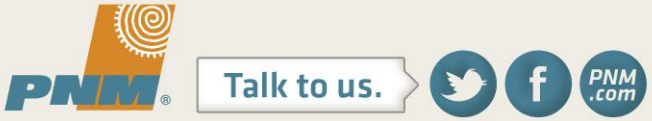


REMAINING ANALYSIS

FUTURE MEETING TOPICS

- February 7 -- Portfolio Comparisons for Pricing and load curve analysis
- February 18 -- Portfolio Comparisons for remaining cases
- March 11 -- Summary of process and impact of Public Advisory Process

Thank you



MAKE SURE WE HAVE UP TO DATE CONTACT INFORMATION FOR YOU

www.pnm.com/irp for documents

irp@pnm.com for e-mails

Register your email on sign-in sheets for alerts of upcoming meetings and notices that we have posted new information to the website.

Meetings Schedule:

Tuesday, Sept. 17, 2013; Friday, Sept. 20, 2013;

Thursday, Sept. 26, 2013; Friday, Oct. 4, 2013;

Friday, Nov. 15, 2013; Thursday, Jan. 9, 2014;

Monday, Jan. 27, 2014, 9 a.m.- noon

IRP GOALS

BALANCE