Pension Plan Actuarial Basics for the Nonactuary

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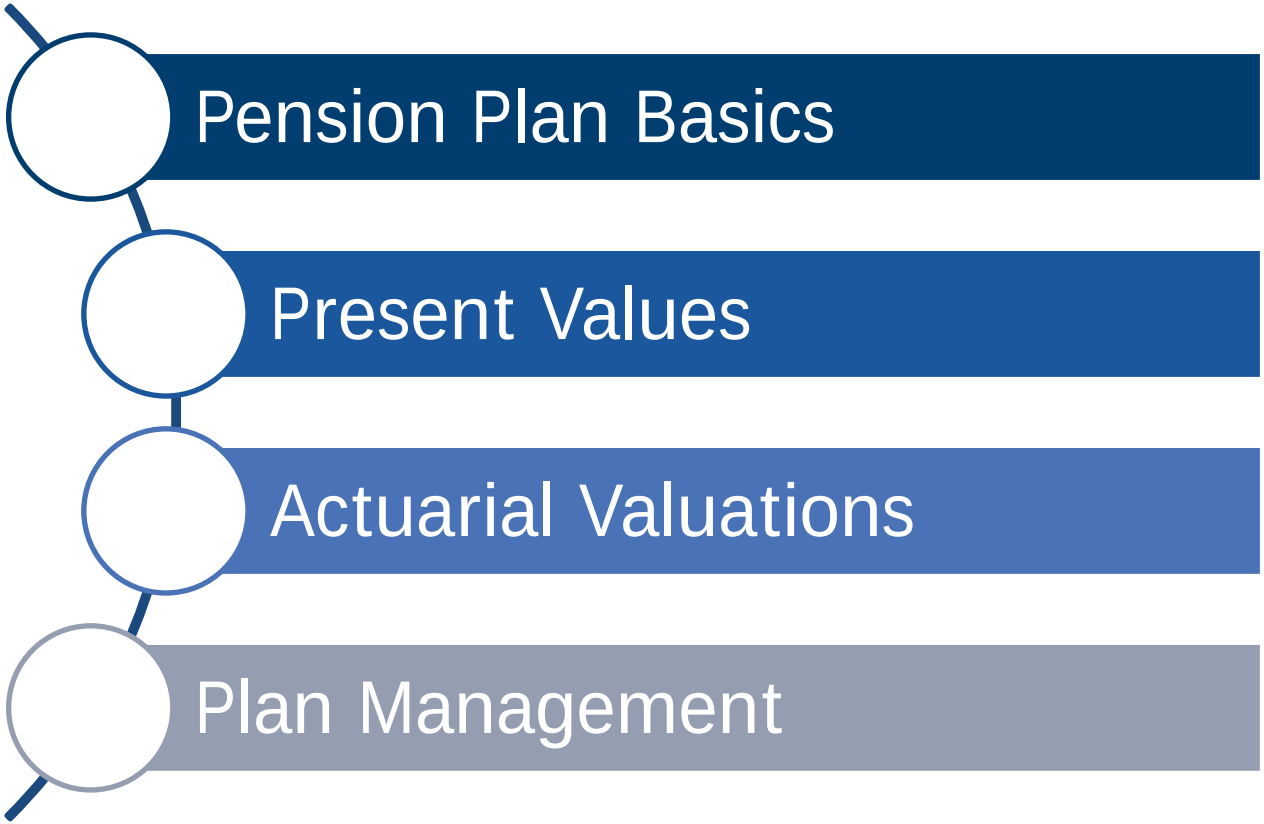
Today's Discussion



Pension Plan Basics

Pension Plan Basics

Defined benefit

The pension plan promises to pay a benefit determined by the plan provisions

Funded over career

Contributions are made over the working lifetime of the participant

Lifetime benefit

Participant receives benefit in retirement for lifetime (and possibly spouse's too)

A pension plan is a promise to pay a predetermined benefit to participants that is funded over their career by contributions and investment growth.

Pension Plan Basics

C + I = B + E

Contributions + Interest = Benefits + Expenses

Contributions and interest earned on those contributions over time must equal benefits paid to participants and expenses of running the pension plan

Pension Plan Basics

C + I = B + E

- How do you ensure that **contributions** and **interest** will be adequate to pay promised **benefits** and **expenses**?
  - Routinely monitor
  - Adjust as necessary
  - Consult an actuary

Pension Plan Basics

- ***What is an actuary?***
  - Professional who assesses financial risks by using mathematics to anticipate the future
- ***Why do you need an actuary?***
  - Unknown contributions
  - Unknown interest
  - Unknown benefits
  - Unknown expenses

Role of the Actuary in a Pension Plan

Monitor plan

Calculate the plan's funded status and contribution requirement

Advise on benefit changes

Model impact of potential plan changes on costs and liabilities

Government Requirements

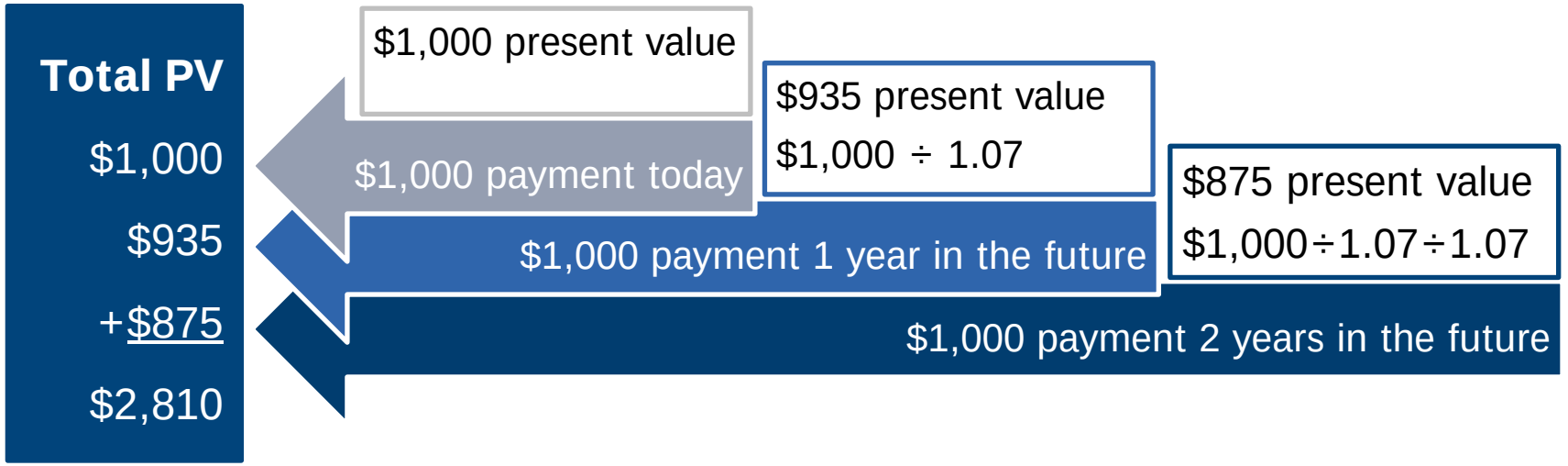
Issue certification letters on plan's status, verify funding for IRS, and other requirements

Actuaries play a critical role in pension plans by monitoring the plan's experience, advising trustees, and certifying the plan's status

Present Values

Present Values

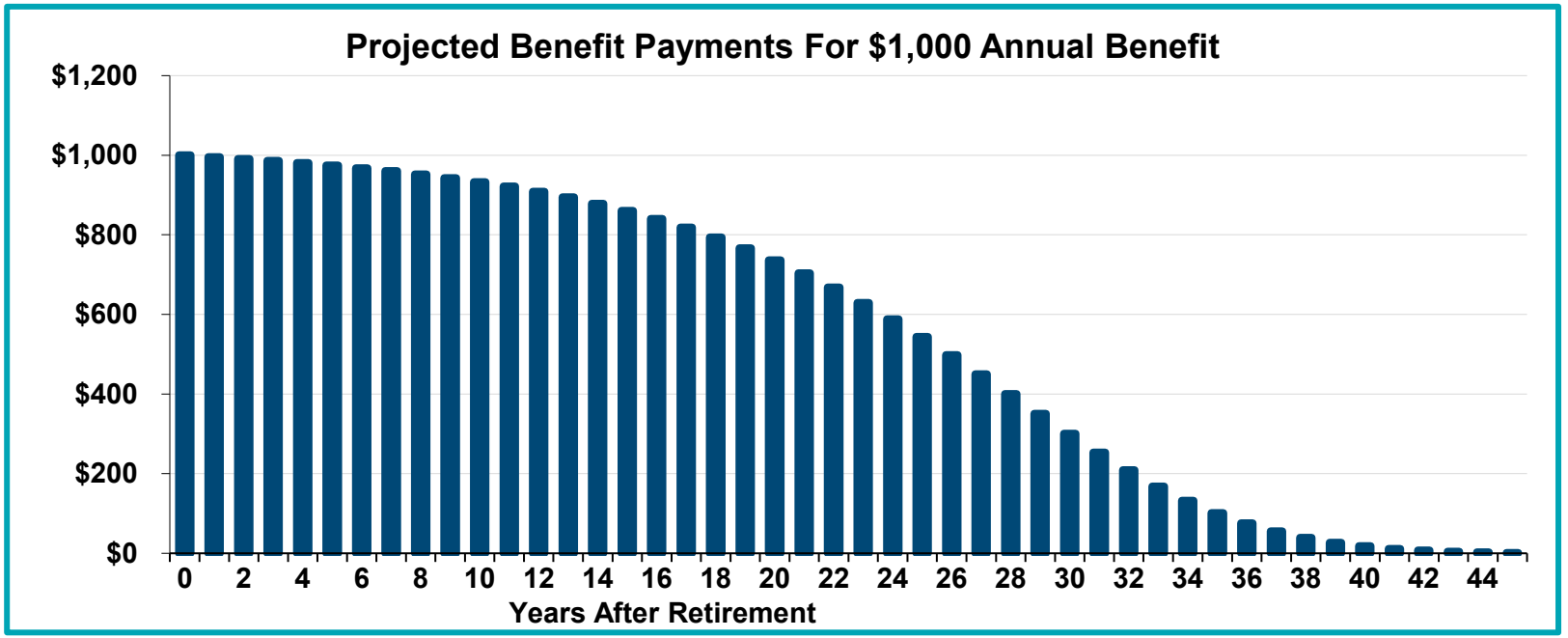
- Present Value (PV) *discounts* future cash flows to today
- Example—The PV of three annual payments of $1,000, starting today, assuming 7% *expected investment return*



Present Values

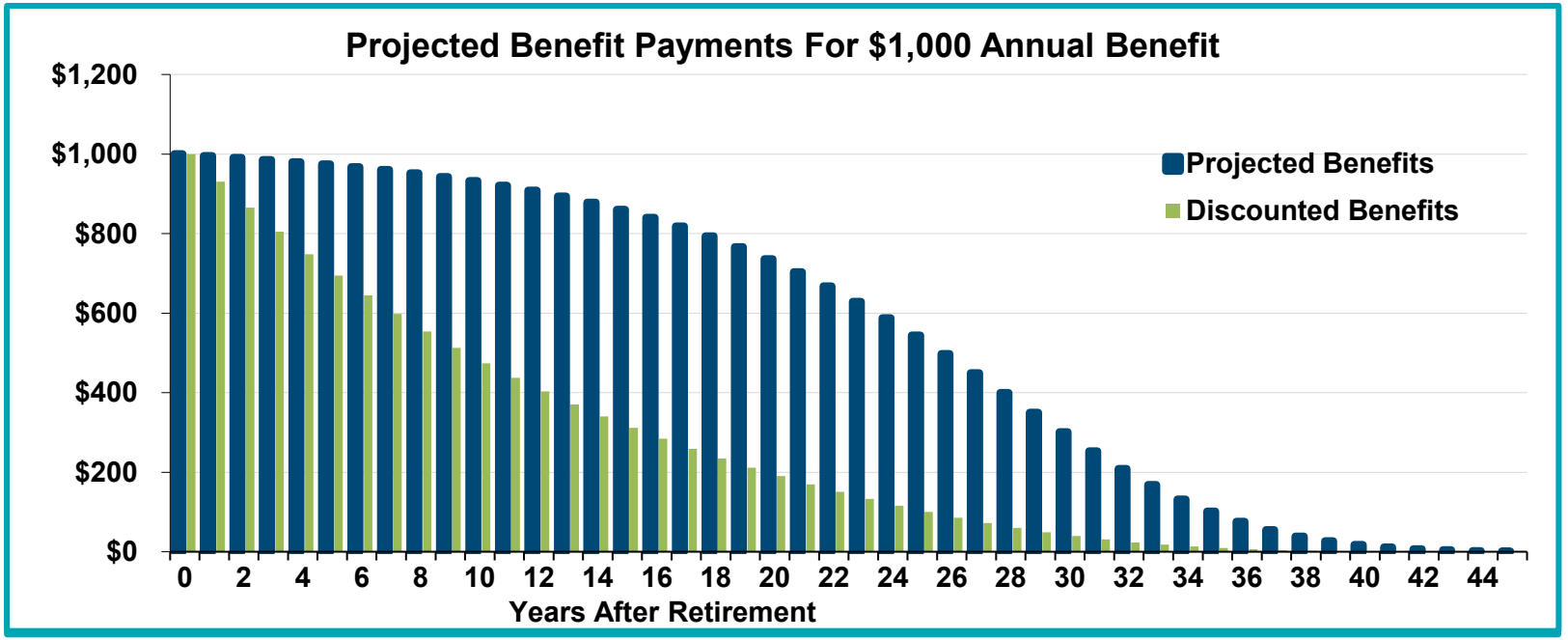
- Present Value (PV) of *pension benefits* also includes a *mortality assumption* (probability that the member remains alive)
- Example—The PV of $1,000 payable annually to John Carpenter while he is alive =
  - $1,000
  - + $1,000 ÷ 1.07 x 99%
  - + $1,000 ÷ 1.07 ÷ 1.07 x 98% + . . .
  - ~ $12,000

Present Values



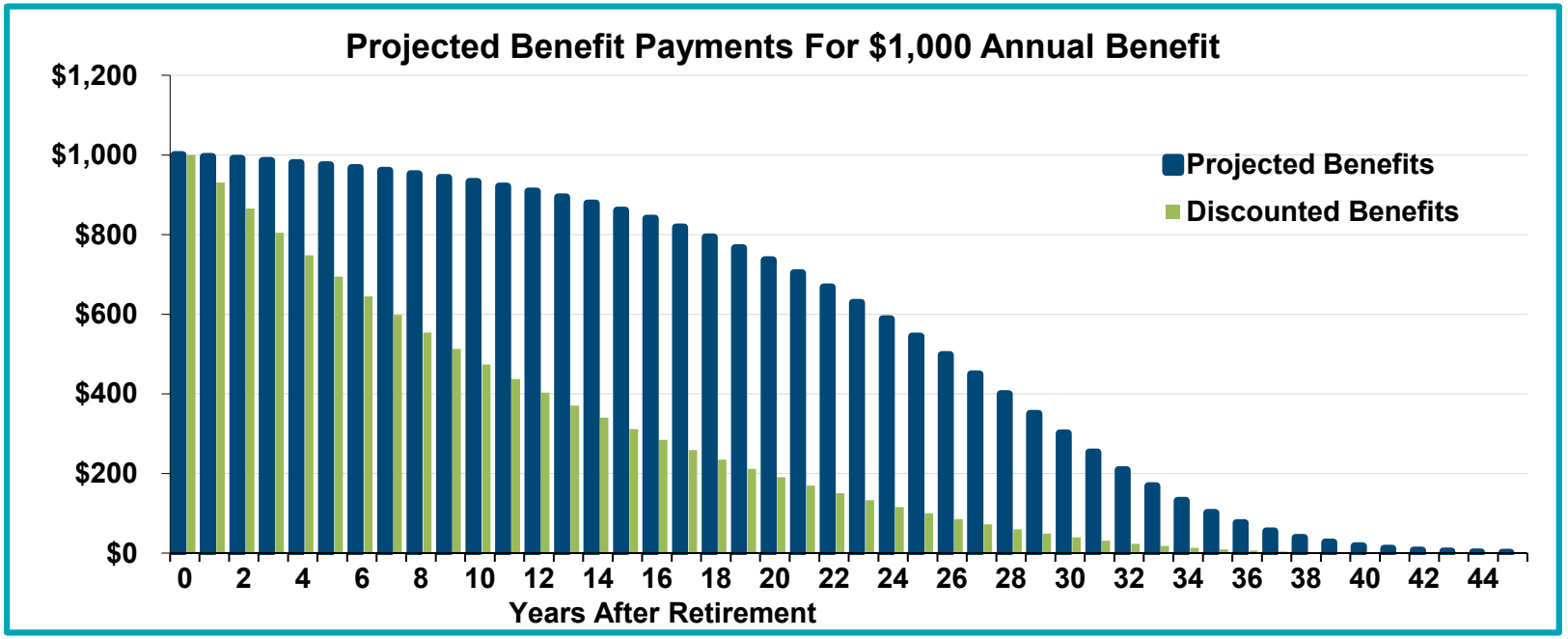
Reflects probability member remains alive and uses a 7% expected investment return

Present Values



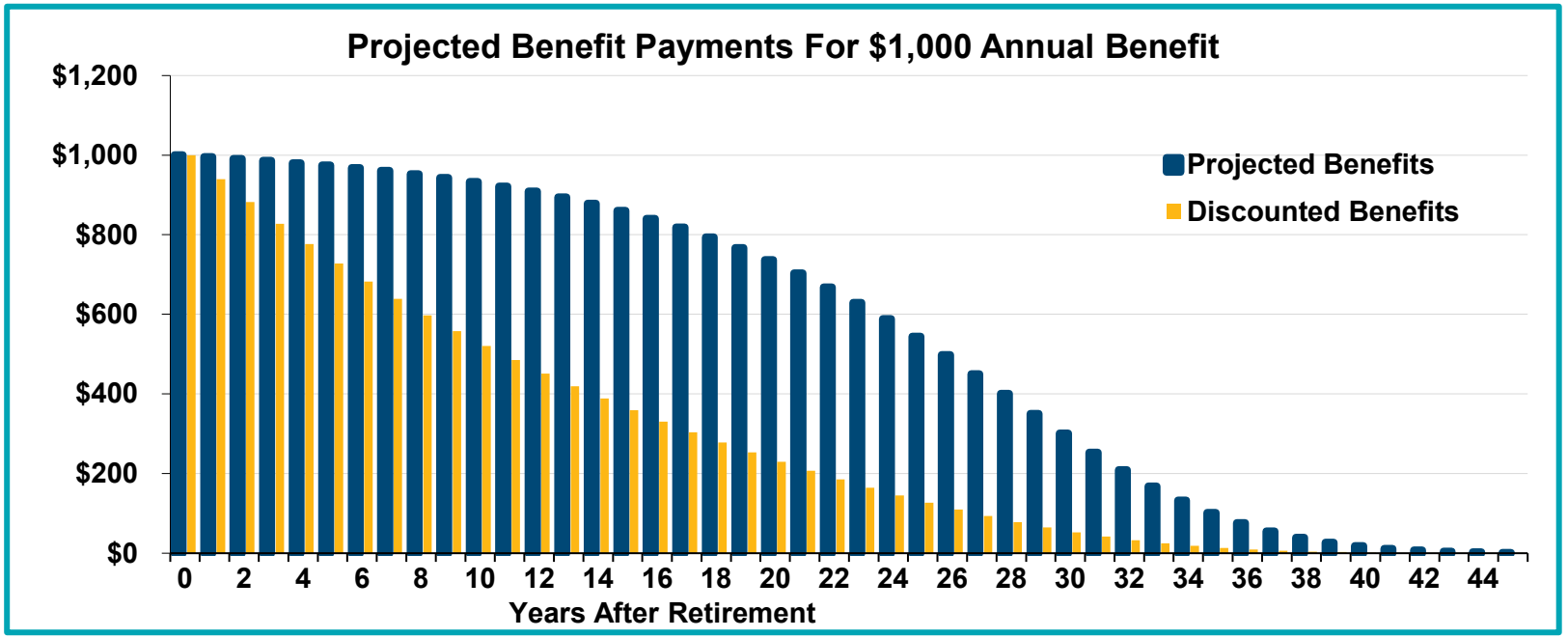
Reflects probability member remains alive and uses a 7% expected investment return

Present Values—
Impact of Varying Expected Investment Returns



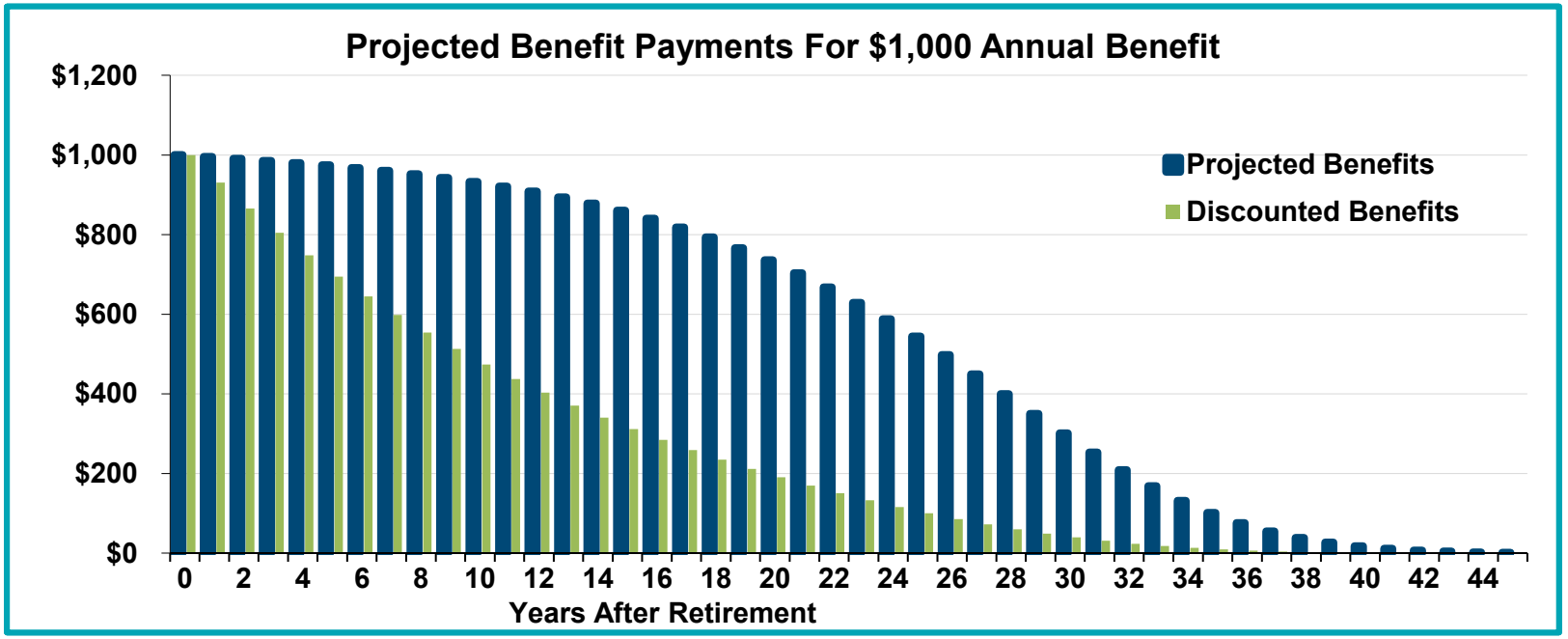
Reflects probability member remains alive and uses a 7% expected investment return

Present Values—
Impact of Varying Expected Investment Returns



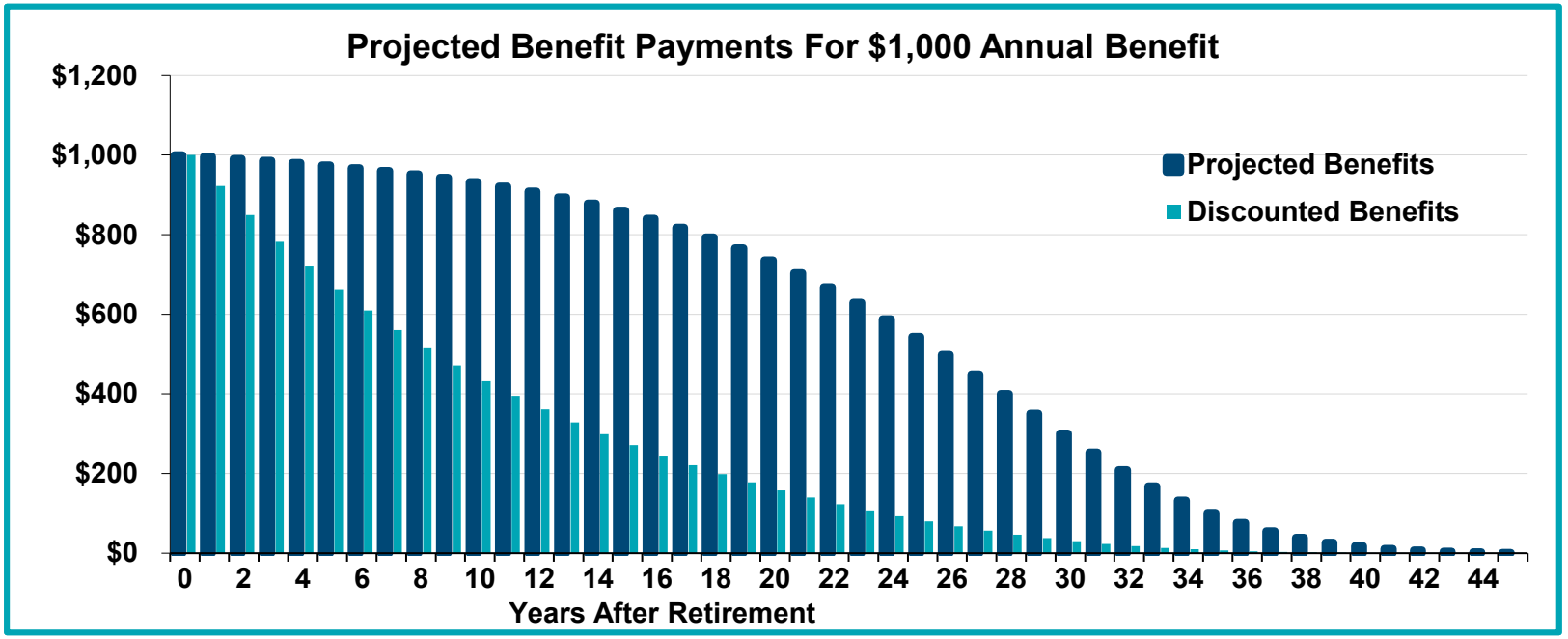
Reflects probability member remains alive and uses a 6% expected investment return

Present Values—
Impact of Varying Expected Investment Returns



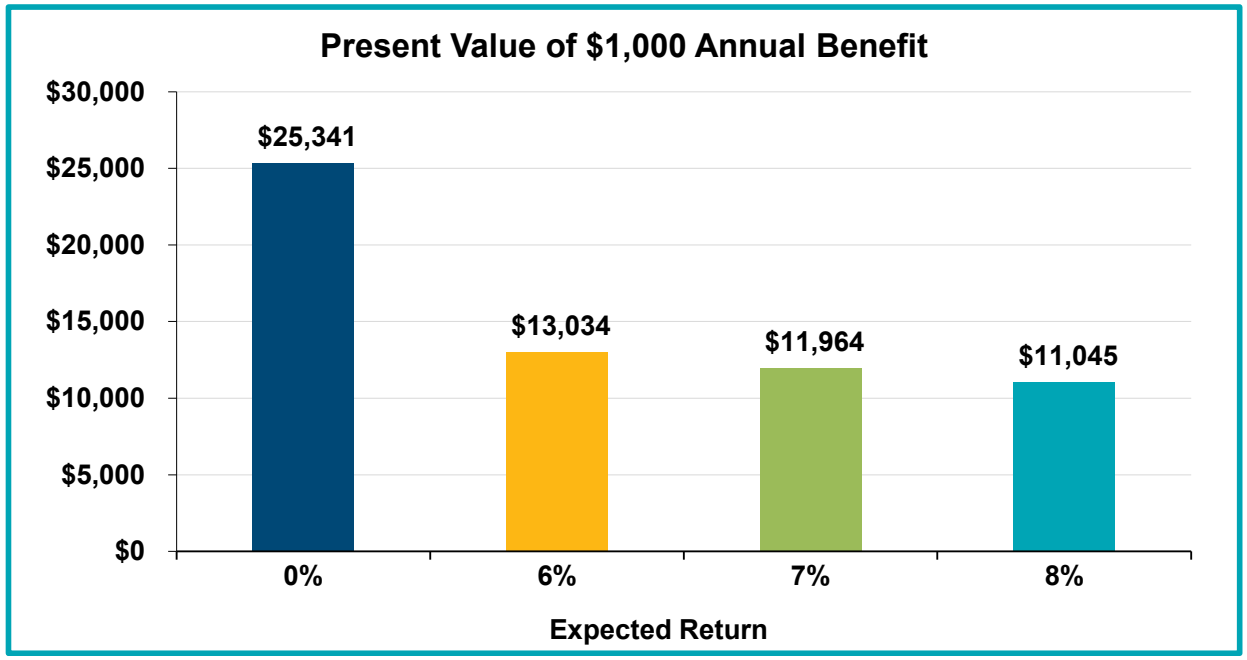
Reflects probability member remains alive and uses a 7% expected investment return

Present Values—
Impact of Varying Expected Investment Returns



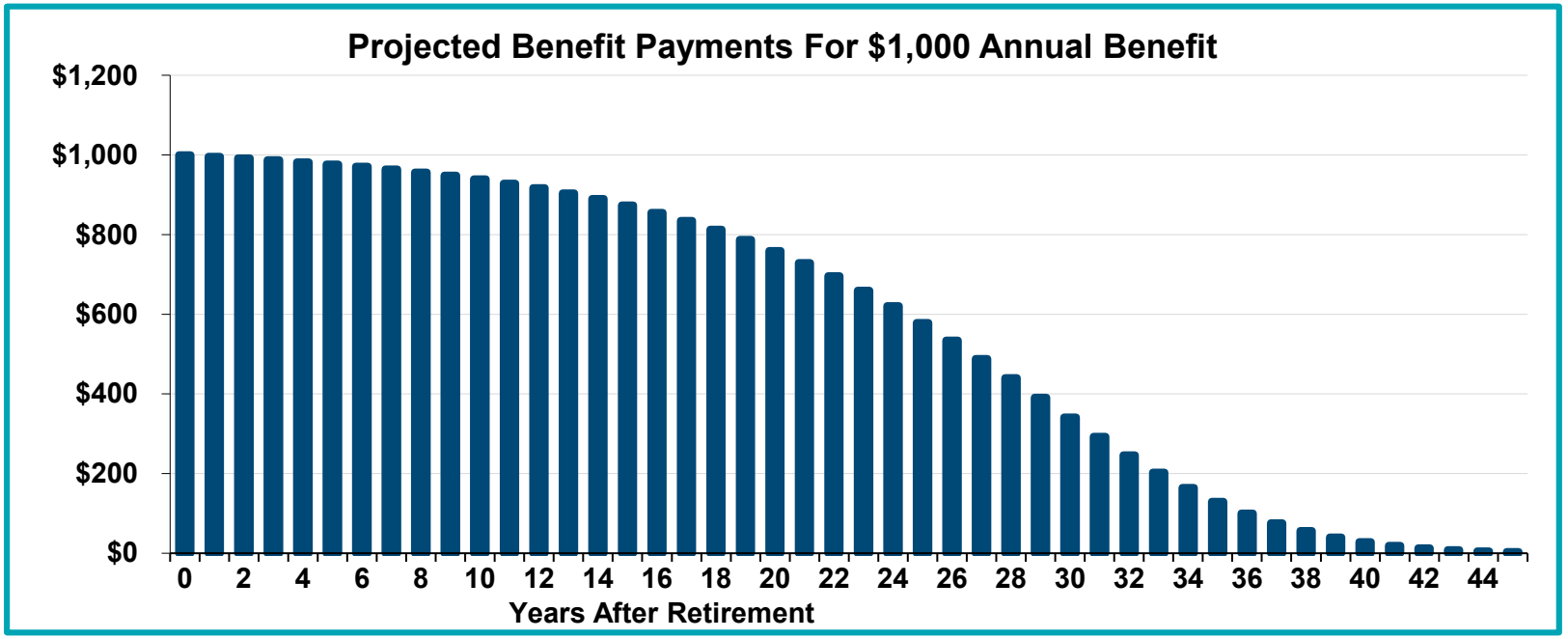
Reflects probability member remains alive and uses a 8% expected investment return

Present Values—
Impact of Varying Expected Investment Returns



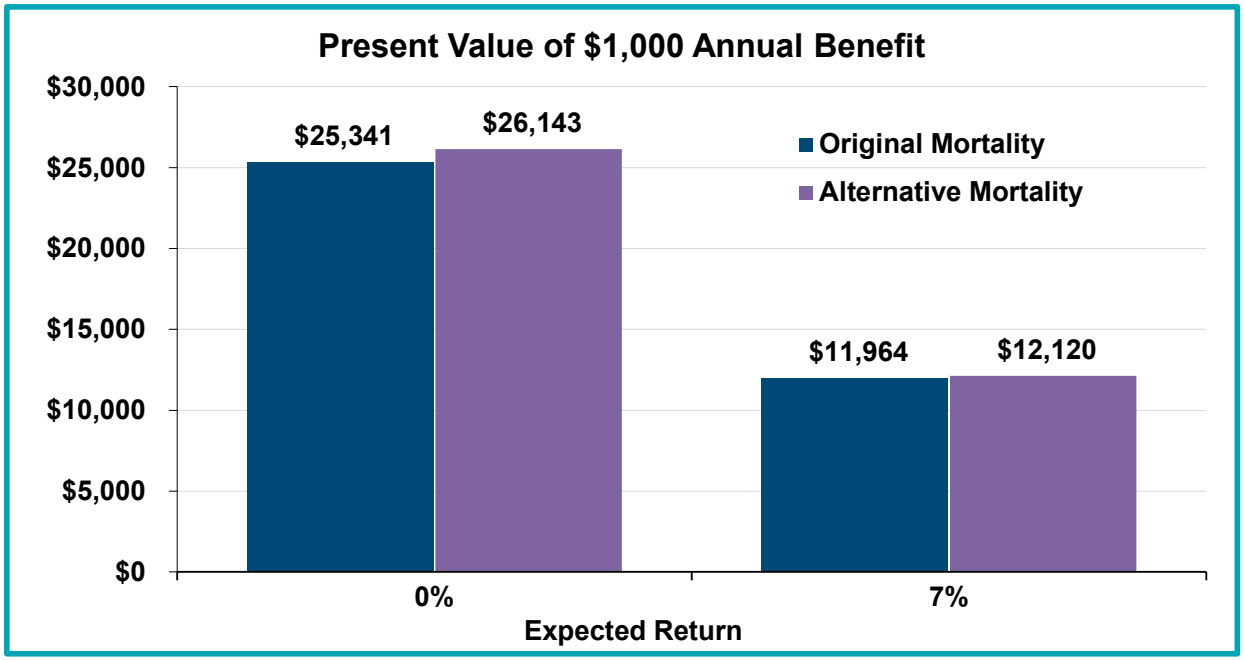
A 1% change (100 basis points) in the expected investment return changes the present value of benefits by about 8%-9%.

Present Values—
Impact of Varying Mortality Assumption



Original mortality assumption with rates reduced by 10%

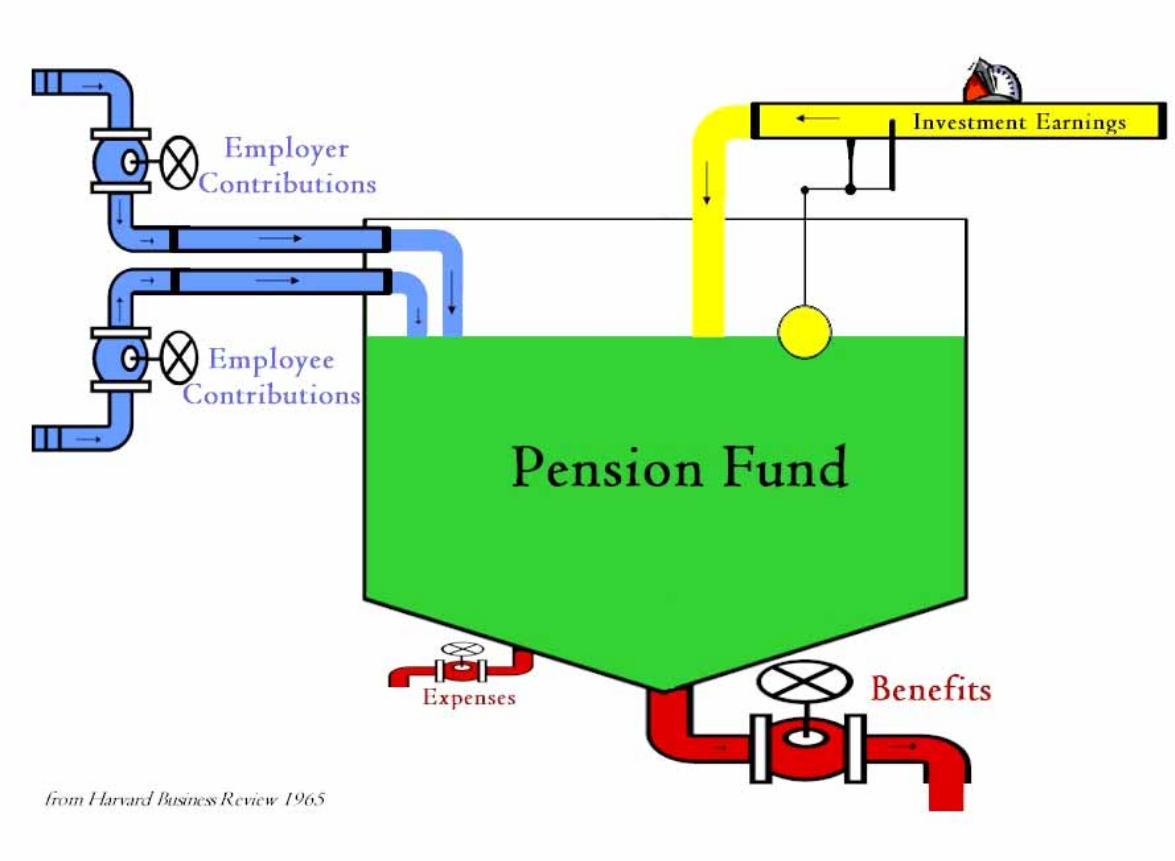
Present Values—
Impact of Varying Mortality Assumption



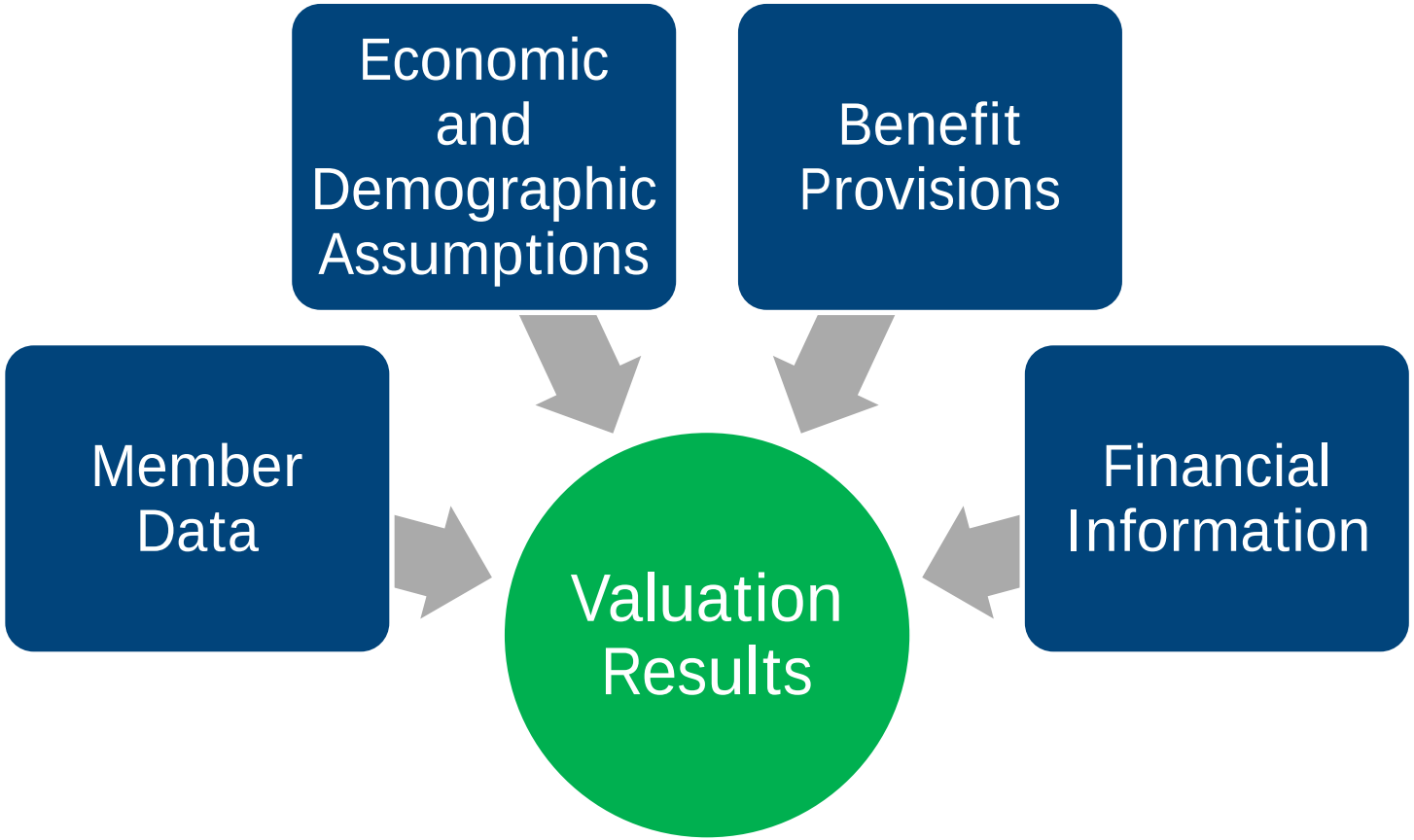
The alternative mortality assumption increased the projected benefits by 3% but only increased the present value of benefits by 1%.

Actuarial Valuations

Pension Valuation Process



Pension Valuation Process



Pension Valuation Process

- Who—Gather data about the plan participants
  - Age, gender, service, hours/contributions, marriage status, etc.
- What—Apply plan provisions
  - Who can get benefits
  - Under what conditions
  - How much
  - For how long
- When—Make assumptions regarding the future
  - Member behavior, life expectancy, investment return, etc.

Actuarial Assumptions

- Ideally unbiased, objective, long term, consistent
- Must balance recent experience with future expectations
  - Demographic: Weighted to recent experience
  - Economic: Weighted to future expectations
- Assumptions normally are determined when experience studies are done and remain in place until the next experience study

Important Actuarial Assumptions

Mortality rates

Assumptions about life expectancy impact projected benefit payments

Investment returns

Expected returns on plan assets affect the present value of future benefits

Retirement rates

When participants are expected to retire influences benefit projections

Contributions

Contributions paid by future actives will fund the plan and may determine the benefit

Reasonable assumptions based on historical data and future expectations are critical for an actuarial valuation

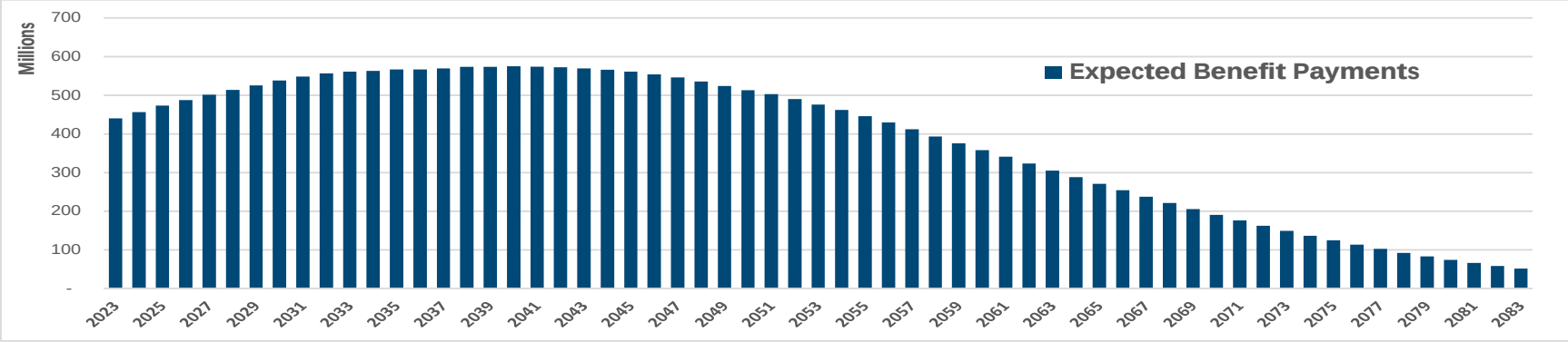
Actuarial Valuation

- Key information in an actuarial valuation
  - Actuarial Liability
    - The present value of benefits promised to participants
  - Assets
    - The amount of money set aside in the trust to pay for benefits
  - Unfunded Actuarial Liability (UAL)
    - The amount of liability not met by assets
  - Funded Ratio
    - Assets/Liability
  - Normal Cost (NC)
    - The present value of the benefits accrued in a single year

Actuarial Valuation

- Additional information in an actuarial valuation
  - Funding analysis—Are contributions adequate to fully fund future benefits
    - Expected contributions
    - Minimum Funding requirement or Board funding policy
  - Risk commentary
  - Summary of Plan demographics
  - Summary of Plan provisions
  - Summary of Plan assumptions
  - PPA Zone Status, ASC960, GASB, Withdrawal Liability . . .

Pension Liabilities



Total expected future benefits

Present Value of Future Benefits		Discount to present
Actuarial Liability	**Normal Cost**	**PV of Future Normal Cost**

Liabilities—Not Just One Number

Measure	Description	Purpose
Present Value of Future Benefits (PVFB)	• Benefits with projected future service • Valuation assumption and method	Information for trustees to understand commitment including future service
Actuarial Liability (AL)	• Benefits earned as of the valuation • Valuation assumption and method	Funding requirement Funding Standard Account
Present Value of Accumulated Benefits (PVAB)	• Unit Credit cost method • Valuation Assumptions	PPA Certification Annual Funding Notice
Present Value of Vested Benefits (PVVB)	• Vested (non-forfeitable) benefits • Potentially different discount rate	Withdrawal Liability calculation
Current Liability (CL)	• IRS mandated mortality • IRS mandated discount rate based on corporate bond rates	Maximum deductible calculation

Plan Assets—Not Just One Number

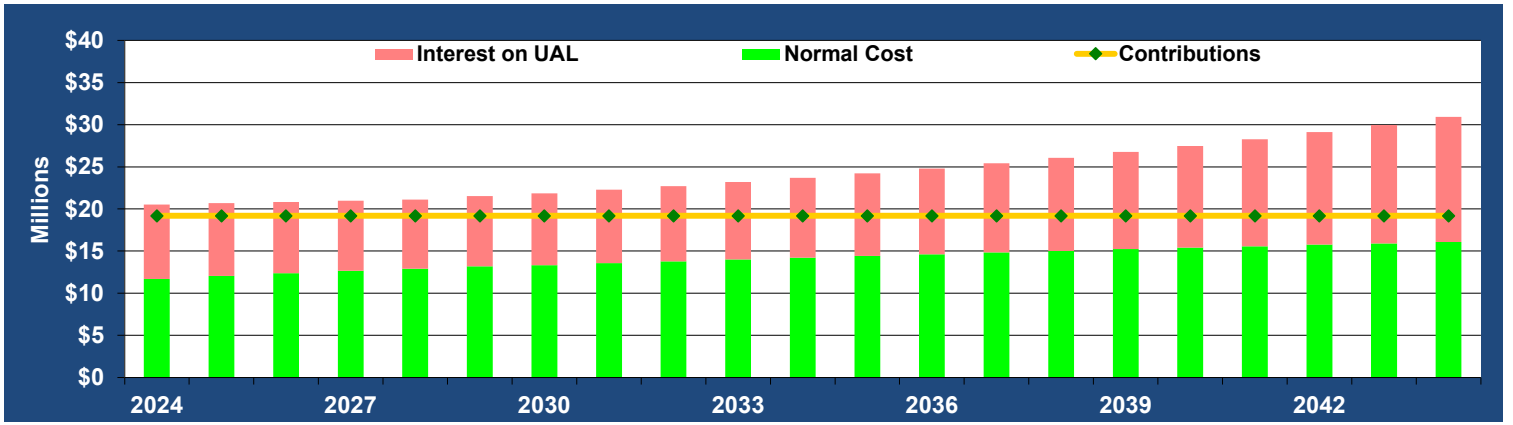
- Market value of assets (MVA)—Current value
  - Amount in the financial statements
  - May be volatile year to year depending on returns
- Actuarial value of assets (AVA)—Smoothed value
  - Often used for funding requirements because it is more predictable
  - A five-year smoothing period is common

Funding a Pension Plan

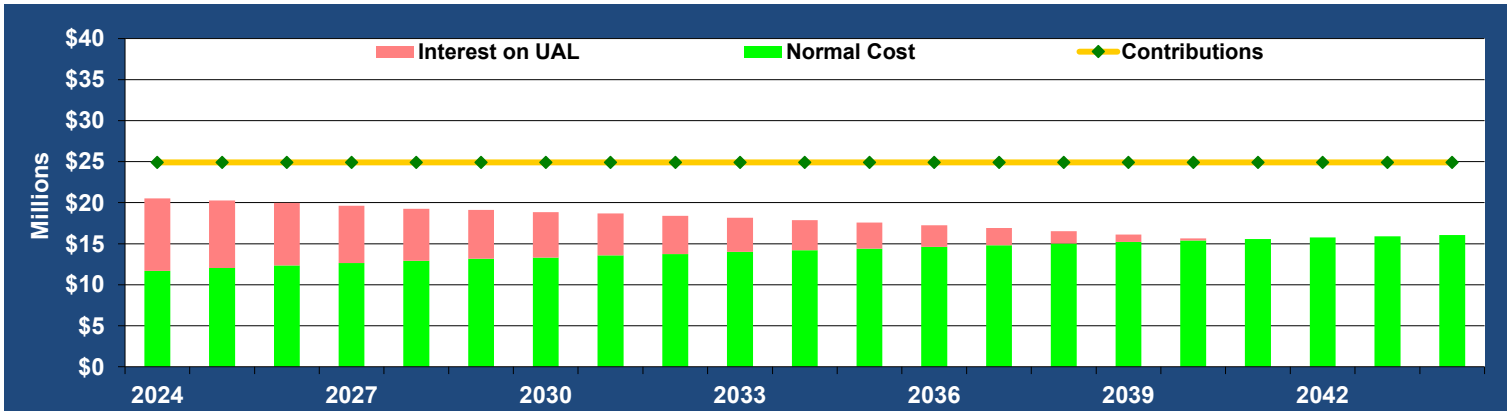
- Two components to pension plan funding
  1. Normal Cost—Pay for the benefit earned in the current year
  2. Amortization of UAL—Fund up assets to cover benefits promised
- Treadwater Contribution measure is Normal Cost plus Interest on UAL
  - If contributions are greater than the Treadwater Contribution, then the UAL is expected to decrease

Funding a Pension Plan

Contributions Less Than Tread Water



Contributions Exceeding Tread Water



Funding a Pension Plan

- Many variations to actual funding
  - Multiemployer Plan contributions are typically collectively bargained
    - Comparison to minimum required contribution
    - Contribution shortfalls reduce credit balance and surpluses increase credit balance
  - Public Plans may have contributions set by legislation or board funding policy
    - Required to disclose Actuarially Determined Contribution (ADC)
- Actuarial Valuation includes assessment of contribution adequacy

PPA Zone Status—Multiemployer Plans

- PPA Status is based on projected funded percentage and Credit Balance

Critical Projected funding deficiency within 4 or 5 years	**Critical and Declining** In critical status and projected to go insolvent within 20 years
Endangered Under 80% funded or projected funding deficiency with in 7 years	**Safe by Special Rule** If no corrective action is required to return to safe within 10 years
Safe "Green" (none of the above)	

PPA Zone Status—Required Actions

Status	Actions Required
Safe	None
Safe by Special Rule	Notice to PBGC, Unions, Employers
Endangered	PPA Notices, Adopt a Funding Improvement Plan (FIP)
Seriously Endangered	PPA Notices, Adopt FIP (more time)
Projected Critical within five years	Notice to PBGC, PPA Notices, may adopt a Rehabilitation Plan (RP)
Critical	PPA Notices, Adopt RP
Critical and Declining	PPA Notice, Adopt RP, Suspension Eligible

Plan Management

Beyond the Actuarial Valuation

- Actuarial Valuation is only a snapshot at one point in time
- To effectively manage a pension plan, it is important to understand:
  - Where the plan is headed in the future
  - How could contribution and benefit changes impact the plan's outlook
  - What is the impact of volatile future investment returns and changing employment levels

What Trustees Can Control

C + I = B + E

Contribution Schedules

Trustees adopt and negotiate contribution schedules, though amounts are often set in bargaining

C

Benefit Changes

Trustees can modify benefit provisions and adjust benefits. More options are available as part of funding improvement or critical status rehabilitation plan.

B

Funding Policy

Trustees establish funding policies to meet objectives, like fully funding the plan over a period

C

Investment Policies

Trustees set investment policies and asset allocation impacting plan funding levels

I

Actuarial Assumptions

Trustees work with actuaries to set assumptions used to calculate liabilities and valuation results

B

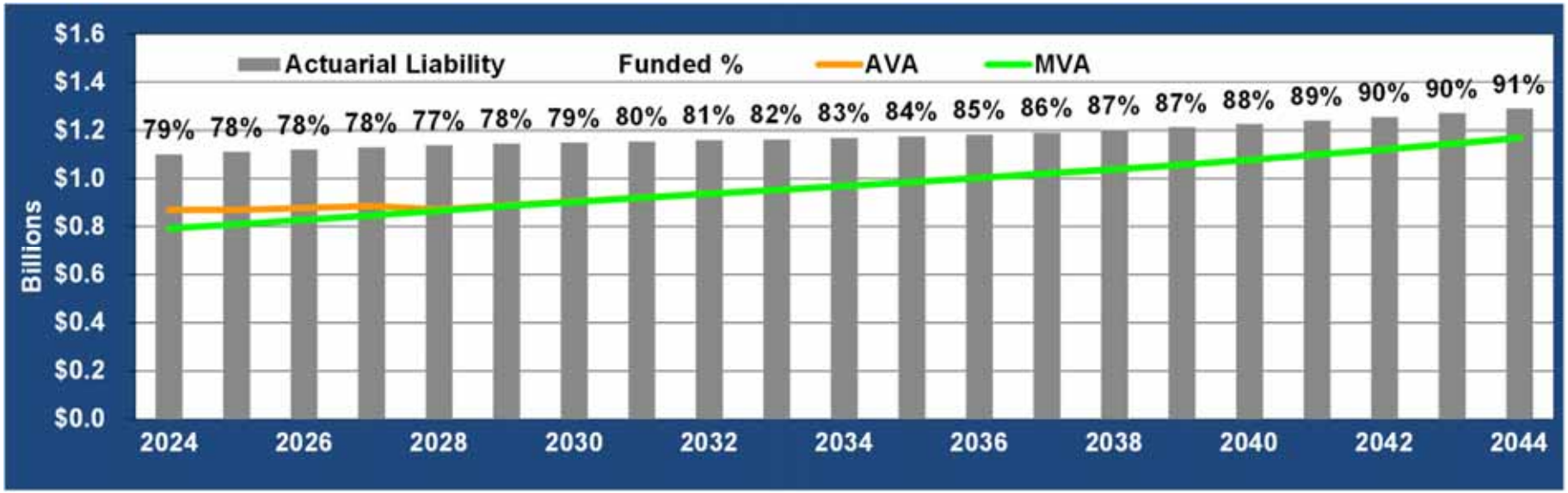
Pension Plan Management

- Trustees monitor the health of the plan and may make changes as needed
  - The valuation is an important snapshot of health
  - Where the plan is headed is more important
- Projections provided by your actuary can be a valuable tool to manage plan health
  - Pension plans are a long-term commitment
  - Changes often take time to impact the plan

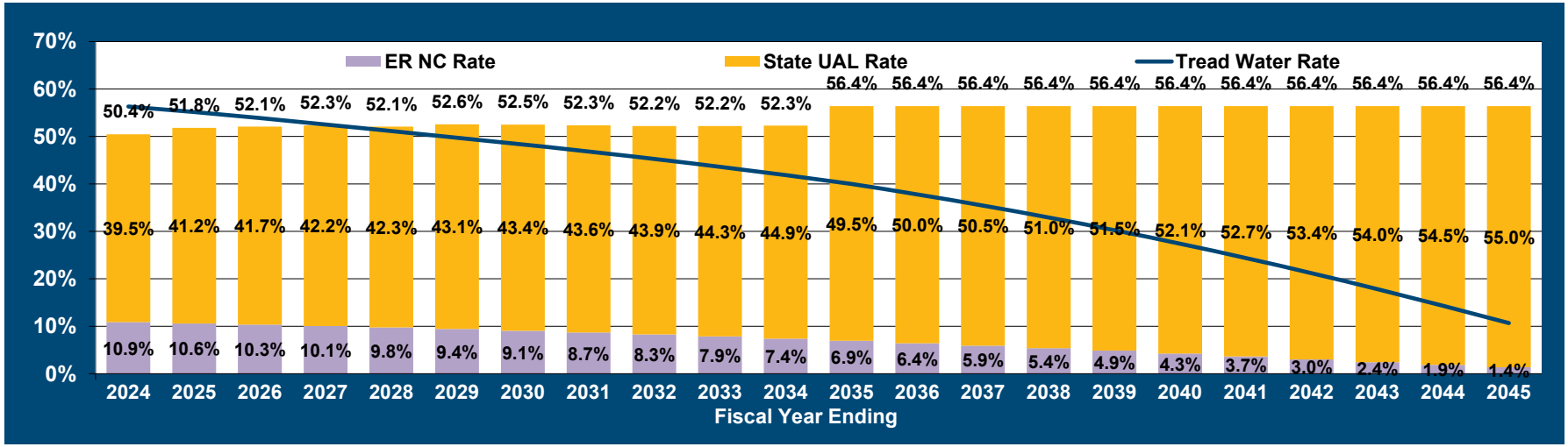
Types of Projections

"What if" Scenarios	Sensitivity Testing	Stress Testing	Stochastic (Monte Carlo Simulations)
• What if all the assumptions come true? • How does the picture change if . . . ?	• How sensitive is the plan to changes in assumptions?	• How is the plan affected by shocks?	• What is the likelihood of an event occurring (*e.g.*, being fully funded, remaining above 80% funded, etc.)?

Pension Plan Forecasts—
Projection of Assets and Liabilities

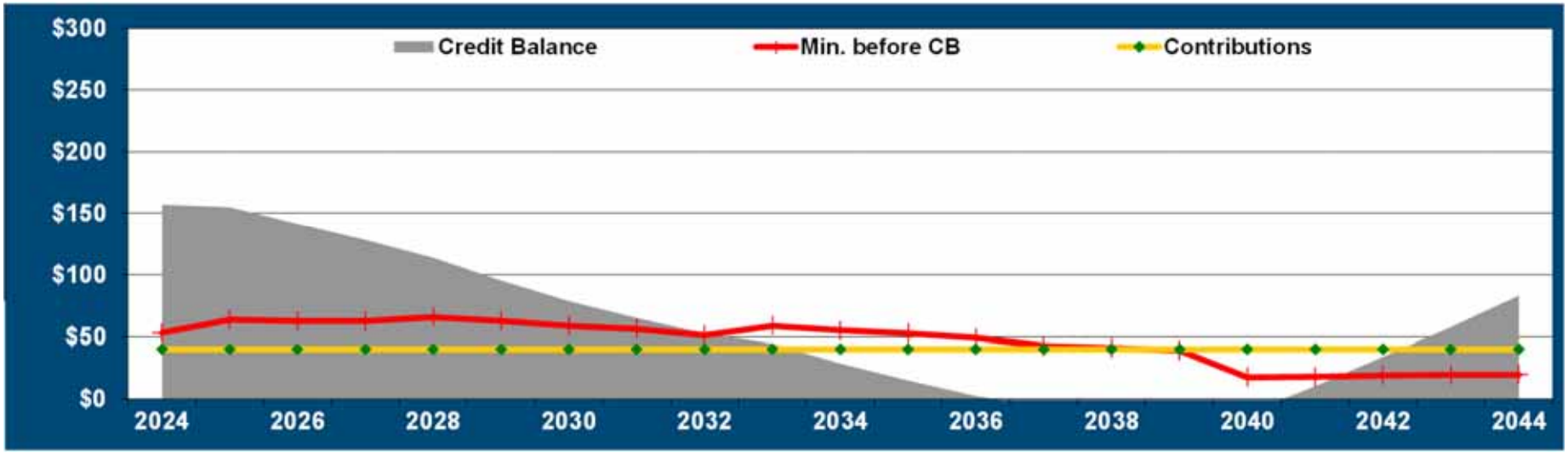


Pension Plan Forecasts—
Projection of Funding Requirements and Contributions



Pension Plan Forecasts—
Projections of PPA Status

Pension Plan Forecasts—
Projections of Credit Balance and Minimum Funding



Dashboard


Stress Testing Dashboard
Benefit Changes
Retro. to Active Yes
Apply to TV No
Apply to Ret. No
Testing Year 2025
Funded Ratio 91.7%
Emergence N/A
Insolvent PYB None
MFD 2035
Year AVA> Liab. 2038
Show Years thru 2044
1999
PYB | Return | Contrib. / hour | Credit / year | Mem Grwth | Hours (mil)
2024 | 7.25% | $ 13.49 | $ 241.00 | -1.0% | 3.08
2025 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2026 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2027 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2028 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2029 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2030 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2031 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2032 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2033 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2034 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2035 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2036 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2037 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2038 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2039 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2040 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2041 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2042 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
2043 | 7.25% | $ 13.49 | $ 300.00 | 0.0% | 3.08
AVE | 7.25%
99% 92% 94% 95% 96% 97% 99% 100% 102% 104% 106%
Safe
Endangered
Seriously Endg
Critical
AVA
MVA
$2.5
$2.0
$1.5
$1.0
$0.5
$0.0
2024 2026 2028 2030 2032 2034 2036 2038 2040 2042 2044
Actuarial Liability + Assets
Credit Balance
Min. before CB
Contributions
$200
$180
$160
$140
$120
$100
$80
$60
$40
$20
$0
2024 2026 2028 2030 2032 2034 2036 2038 2040 2042 2044
Funding Standard Account

Key Takeaways

- Pension plans can provide dignified retirement for members
- Trustees are responsible for managing the health of the plan
- Actuarial valuations give annual snapshot
- Use projections to understand:
  - Where the plan is headed
  - How changes now will impact the future
  - Sensitivity of the plan to assumptions.

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Session Evaluation