



PROJECT AIR FORCE

An Optimization Method for Assessing Options for US Air Force Overseas Combat Support Basing

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Briefing Roadmap

- **The deterrence paradigm and its implications for the economics of defense**
- **A process for selecting Overseas Forward Support Locations (FSLs) that recognizes this new paradigm and the change in economic emphasis**
- **Selected sets of storage locations that will meet the Air Force's global force-projection needs**
- **Conclusions**

The Deterrence Paradigm Has Changed Dramatically In the Last 15 Years

Deterrence in the Nuclear Age

- Prevent nuclear exchange with peer states by building a nuclear arsenal
- Deter conventional aggression by state actors by building large standing forces
 - forward based forces
 - forward based WRM
- Conduct occasional exercises to demonstrate capabilities
- Conduct humanitarian and lesser conventional missions with forces built for deterrence

Deterrence in the Age of Persistent Global Insurgency & Counterinsurgency

- Isolate state actors and pressure them to reduce their nuclear arsenals
- Identify non-state actors and take action to remove their capabilities
- Deter conventional aggression by rapid and recurring deployments for exercises
- Conduct frequent exercises across the globe to demonstrate force projection capabilities
- Conduct humanitarian missions with capabilities developed for deterrence
- Develop methods and capabilities to increase homeland security

The New Environment Requires Expeditionary Deployment Capabilities

- **Cold War planning assumed forces, personnel, support materiel would be based at permanent overseas bases geared towards known scenarios**
- **USAF has moved to an Air and Space Expeditionary Force concept:**
 - **Forces rapidly deploy to Forward Operating Locations (FOLs) on an as-needed basis**
 - **Forces supported by combat support materiel prepositioned at Forward Support Locations (FSLs) located in strategic regions**

The New Deterrence Paradigm Requires Changes to the Allocation of Resources in the Budget

- **To deter aggression, the AF needs to demonstrate force projection capabilities via rapid and recurring deployments for frequent, global-ranging exercises**
- **This requires increased spending on**
 - deployment/redeployment costs for exercises
 - operating costs while deployed for exercises
- **Should deterrence fail, the AF must have the capabilities necessary to meet contingency operations' demands**
 - requires resources such as War Reserve Materiel and OCONUS infrastructure, including FSLs
 - these resources are also used during exercises, however the contingency demands drive the resource requirement levels

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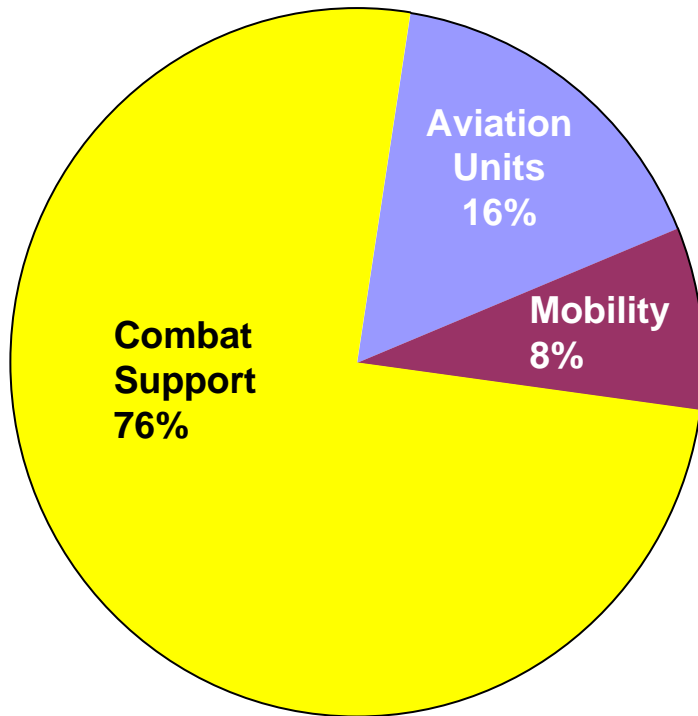
PAF Set Out to Determine What Bases Would Provide Optimal Combat Support under the New Paradigm

- **How capable are the Air Force's current overseas combat support bases of managing the future environment?**
- **What are the costs and benefits of using additional or alternative overseas combat support bases for storing heavy combat support materiel?**

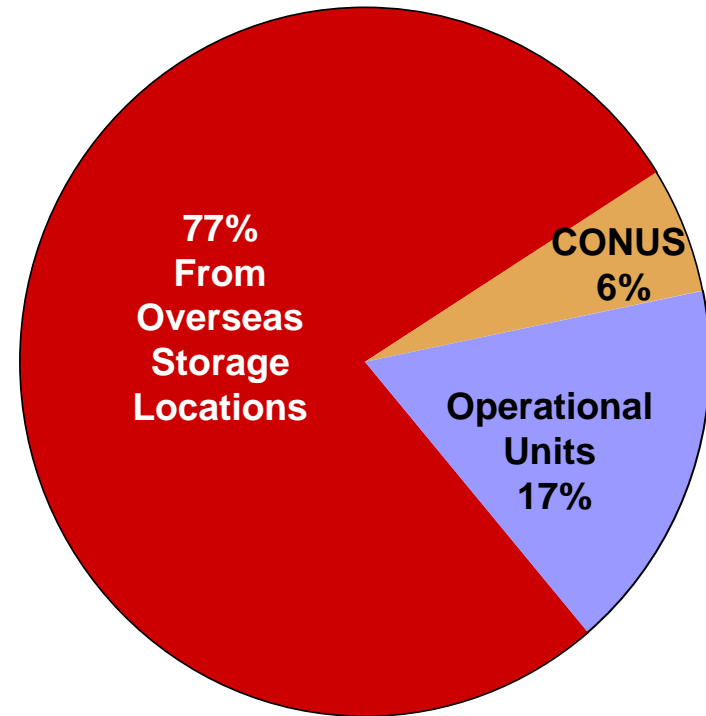
We Focus on a Diverse Set of Combat Support Resources because...



...Combat Support Materiel Dominates Deployment Movement Requirements



Air Force Deployments during OIF
123,000 tons moved during the first 100 days

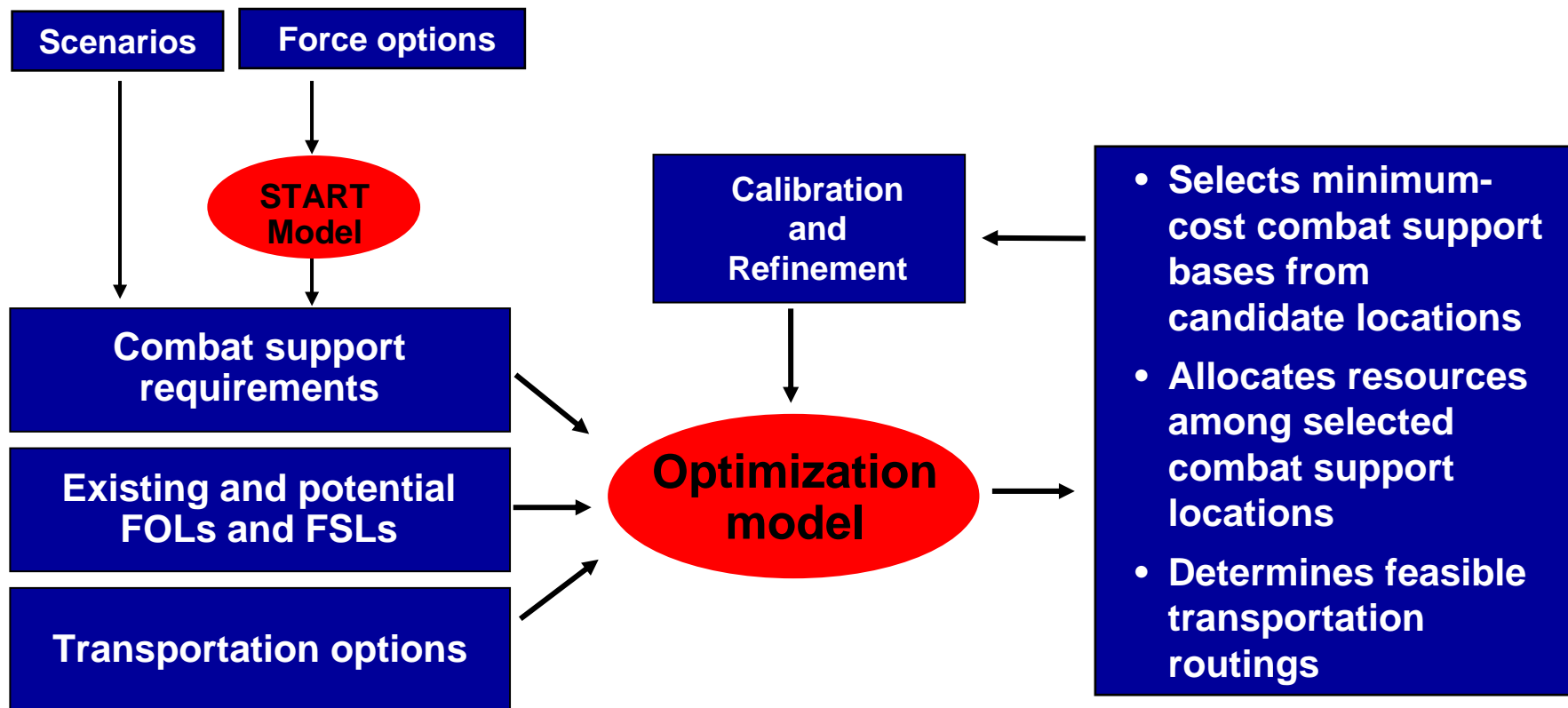


Source of OIF Movements
95,000 tons of Combat Support materiel

These Heavy Resources Must Be Moved from Storage Sites to Forward Operating Locations



We Developed a Model to Analyze Current and Potential Options for Global FSLs



Costs include facility, transport, and storage costs for conducting deterrent exercises

Constraints include storage and throughput, transport availability and capacities, time-phased demand, and the capability to support MRCs

The Optimization Model Addresses Location, Inventory, and Transportation

- **A mixed integer optimization model**
 - Selects a candidate mix of support options
 - Allocates resources to selected locations
 - Develops a global transportation network
- **Multiple objectives are possible**
 - Minimize total support costs (facility construction, transport, storage)
 - Minimize deployment time
 - Minimize airlift
- **Constraints**
 - Deployment timeline (time phased demand) for “min cost”
 - Upper bound on total number of facilities for “min time”
 - Vehicle capacity, availability, and utilization (multiple modes)
 - Throughput limitations at support & operating locations
 - Storage capacity at support locations (multiple commodities)

A Cost and Benefit Analysis Requires Examining a Wide Range of Parameters

- **Cost**

- Construction and/or expansion of facilities
- Operations and maintenance
- Transportation for peacetime and training missions
- Country cost factors

- **Transportation options: land, sea, and air**

- Land borders and canals
- Vehicle inventories and capacities (weight, volume)

- **Time-phased operational goals**

- Both Initial Operating Capability (IOC) and Full Operating Capability (FOC) deployment constraints

A Cost and Benefit Analysis Requires Examining a Wide Range of Parameters

- **Site selection**

- From more than 300 FSLs and 100 FOLs, we reduced the sample to 50 FSLs and 60 FOLs
- We only considered Category 3 (48 to 96 hours) & 4 FOLs (72 to 120 hours)
- We included Afloat pre-positioning for both WRM and munitions

- **Storage capacity**

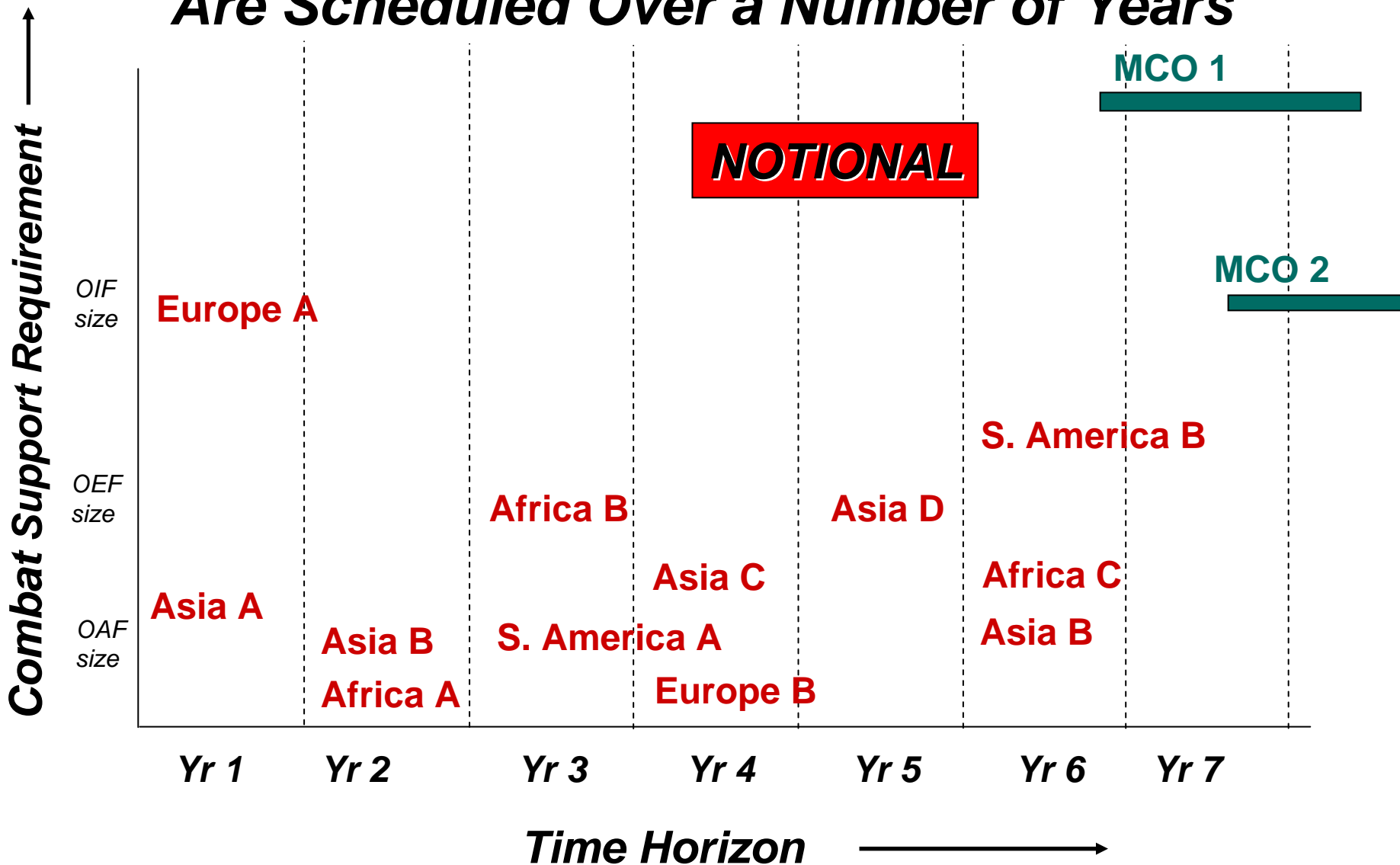
- Weight and volume, NEW
- Afloat or land-based

- **Throughput capability**

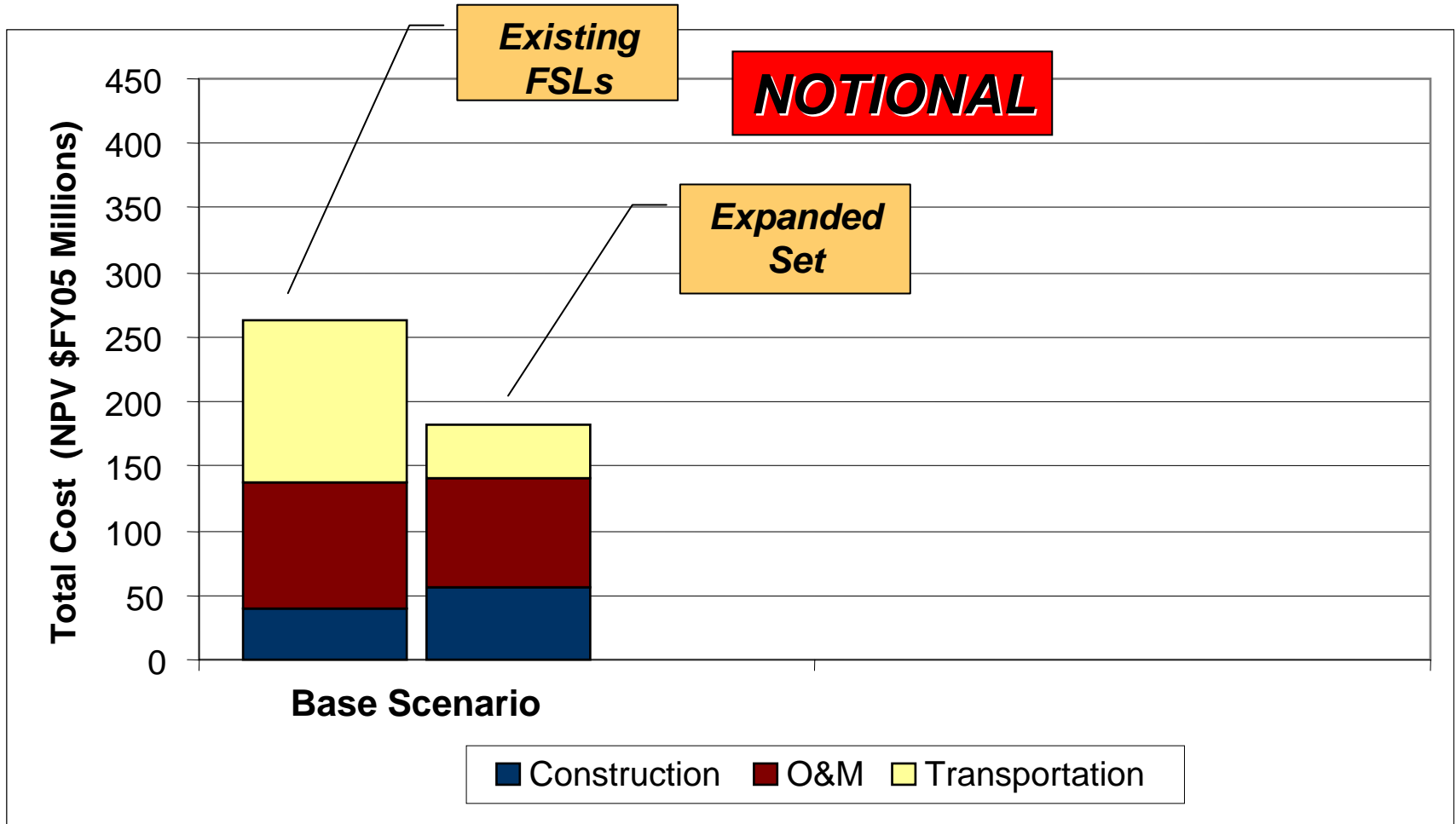
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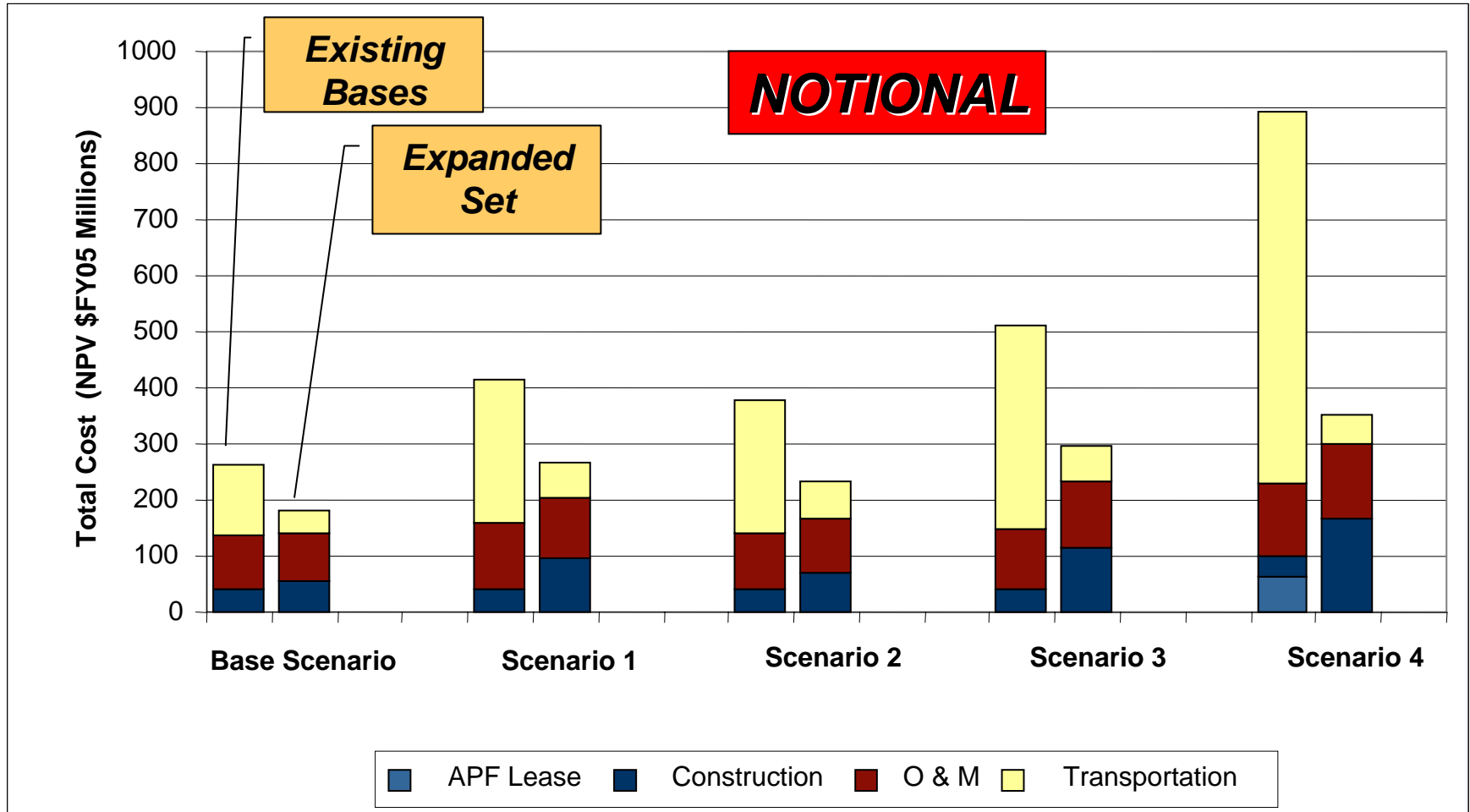
Ranges of Force and Combat Support Packages Are Scheduled Over a Number of Years



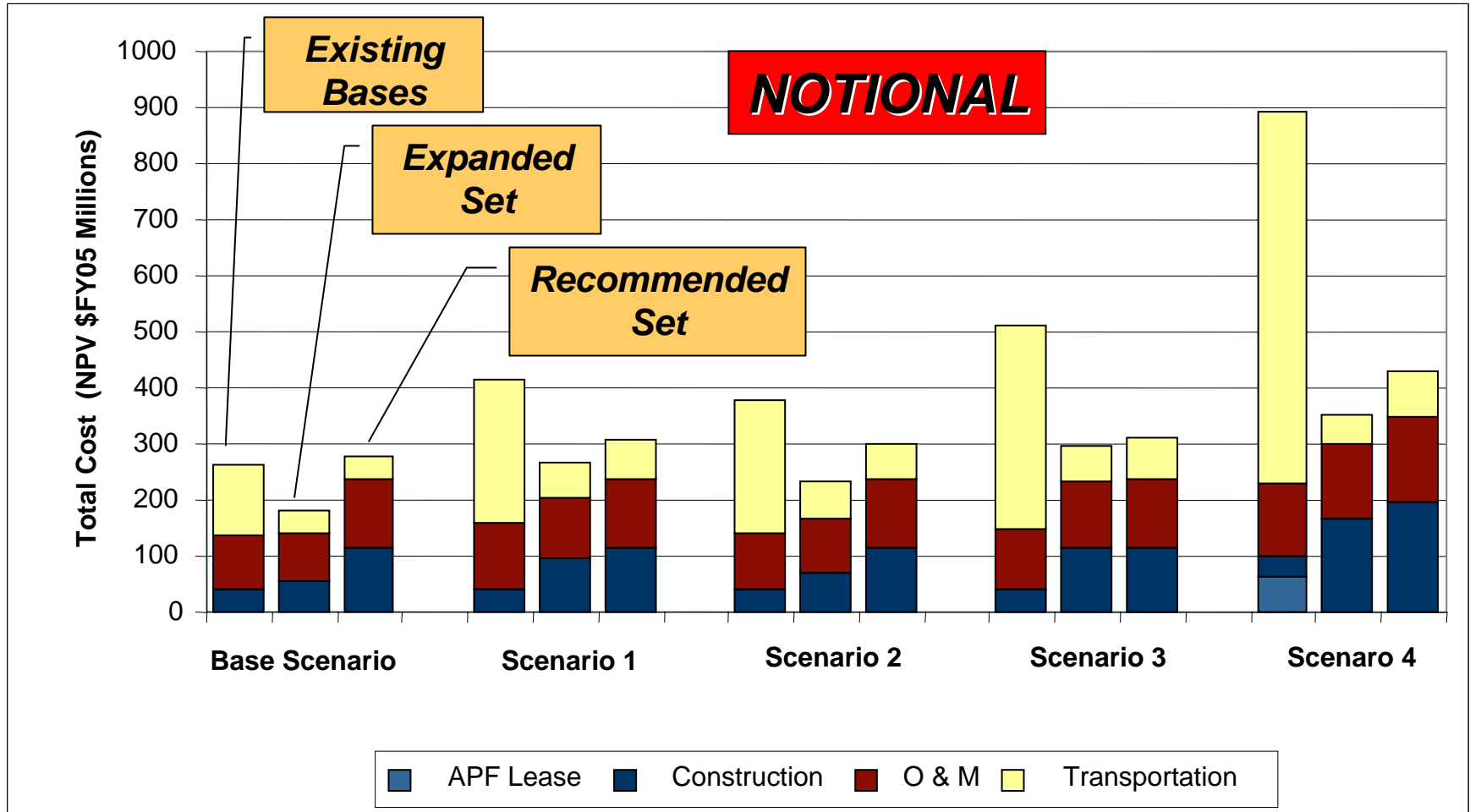
Utilizing New FSLs Affords Equal Capability as the Existing Locations at Lower Cost



To Ensure that Planning is Robust, We Examine Alternative Future Scenarios



A Robust Solution Performs Nearly as Well as the “Optimal” Solution for each Scenario



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- **FSL postures proposed without accounting for transportation constraints may prove inferior once these considerations are included in the analysis**
- **In an uncertain future threat environment, a wide range of potential engagements must be considered, with the goal of determining robust solutions**
- **This analytic method can address a wide range of basing decisions**
 - **Substantial savings in cost, as well as in airlift, are possible within deployment timeline goals**
 - **The model can determine postures that minimize deployment time**
 - **“What if” analyses allow for political considerations**



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