

Integrated Program on Energy Efficiency & Conservation

Overall Strategies

Human Resource

- Capacity building of MSMEs in energy management and conservation
- Capacity building on local development of energy monitoring software & hardware systems
- Strengthening DOST regional offices energy auditor's capability

R&D Technologies

- Establishment of Philippine MSMEs energy profile using innovative methods and technologies
- Selection and adoption of low-carbon technologies for MSMEs application
- Technology demonstration of online energy monitoring and reporting system for government offices
- Local development of energy-efficient devices and equipment (reluctance electric motors, lightings, waste-heat recovery systems, energy data analytics, full energy management control systems)

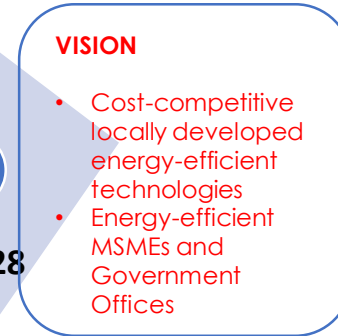
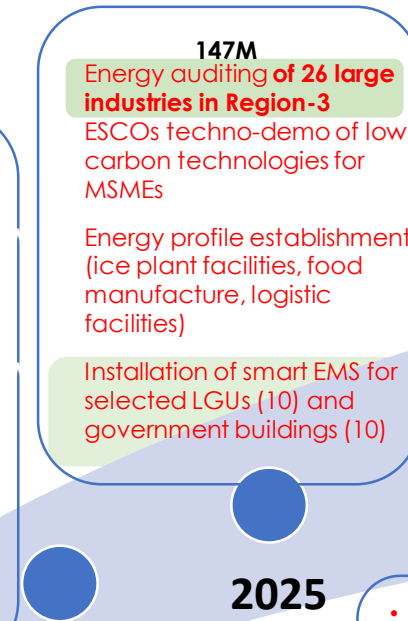
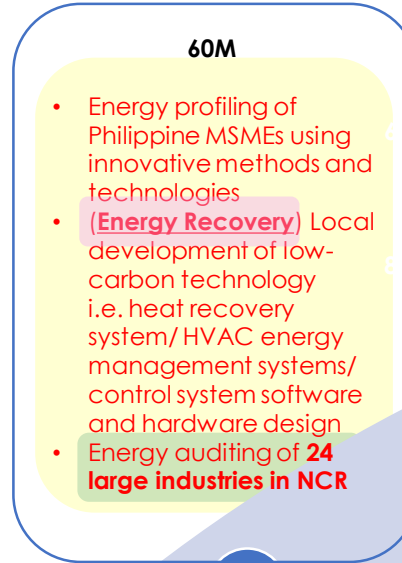
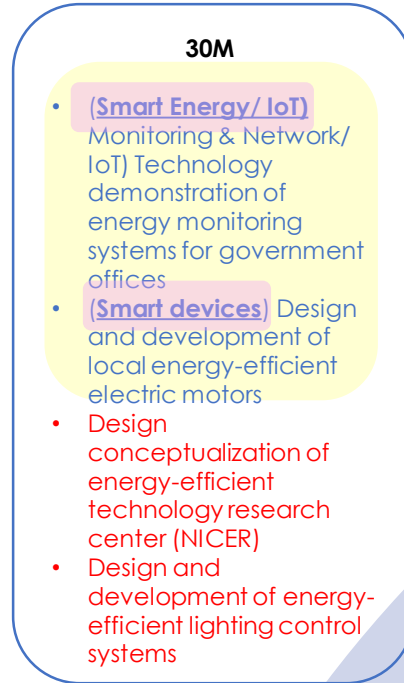
Facilities / Services

- Establishment of Energy Research and Innovation Center (NICER)
- Establishment of Energy-Efficient Technology Aggregator Hub

S&T Policies

- Development of policy recommendations for MSMEs incentive for the use of energy-efficient technologies

POSSIBLE SOLUTIONS



Overall Outcomes

Human Resource

- Technology equipped and energy-efficient MSMEs
- New skills developed on energy management systems software/hardware design
- DOST regional offices energy auditors capacitated on new technology trends
- Increased numbers of energy researchers and developers

R&D Technologies

- New industry business opportunities on the development of local technologies (reluctance motors, EMS control systems, software and hardware systems)
- Increased numbers of energy research and development projects

Facilities / Services

- Network and linkages established for local R&D collaboration thru NICER
- Central hub established for energy-efficient technology acquisition (supply and services)

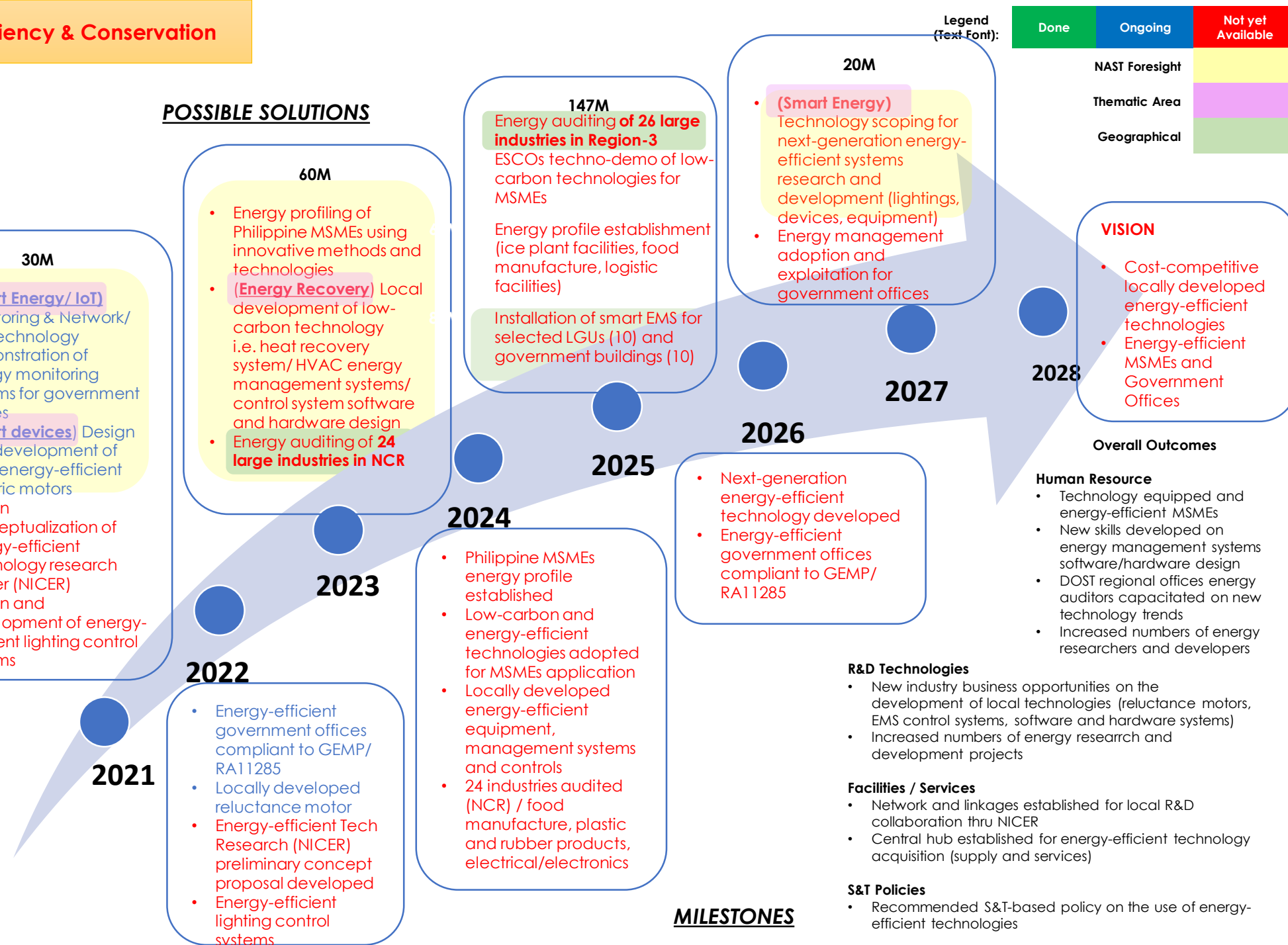
S&T Policies

- Recommended S&T-based policy on the use of energy-efficient technologies

Legend
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	Done	Ongoing	Not yet Available
NAST Foresight			
Thematic Area			
Geographical			

MILESTONES



Overall Strategies

Human Resource

- Capacity building on Micro-hydro turbine design/fabrication
- Capacity building on Micro-hydro site assessment/evaluation
- Capacity building on Micro-hydro operation and maintenance

R&D Technologies

- New and emerging turbine technologies
- Localization of electromechanical components
- Development of hydrokinetic turbines
- Low-head, low flow hydraulic turbine technology
- Supply-chain analysis of available MHP technologies

Facilities / Services

- Establishment of Micro-hydro Turbine testing facility

S&T Policies

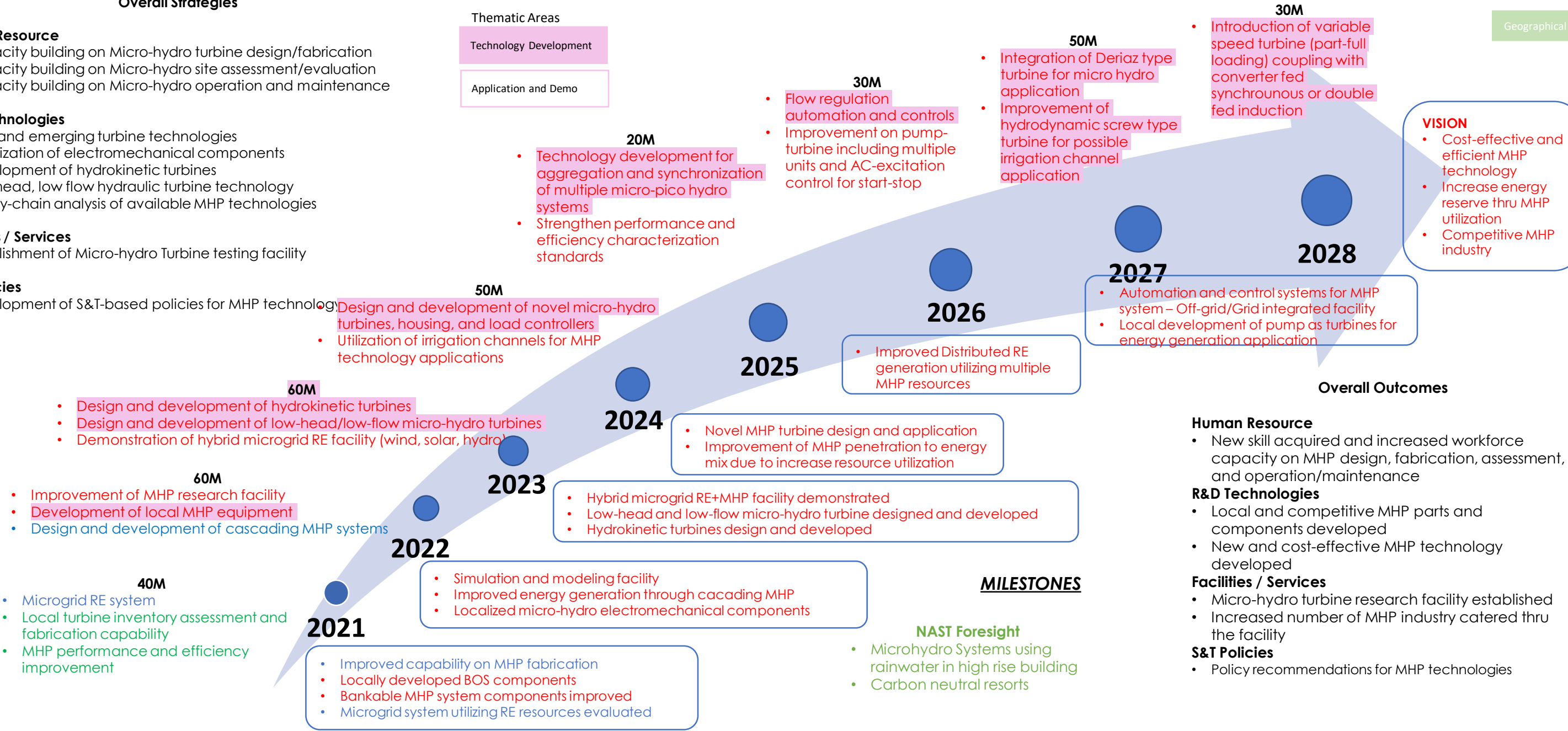
- Development of S&T-based policies for MHP technology

Thematic Areas

Technology Development

Application and Demo

Geographical



Overall Strategies

POSSIBLE SOLUTIONS

Human Resource

- Consultation meeting with hydrogen industries and experts
- Improve local expertise on hydrogen development, from feedstock to utilization
- Capacity building on hydrogen storage design and development
- Capability building on hydrogen logistics and transportation

R&D Technologies

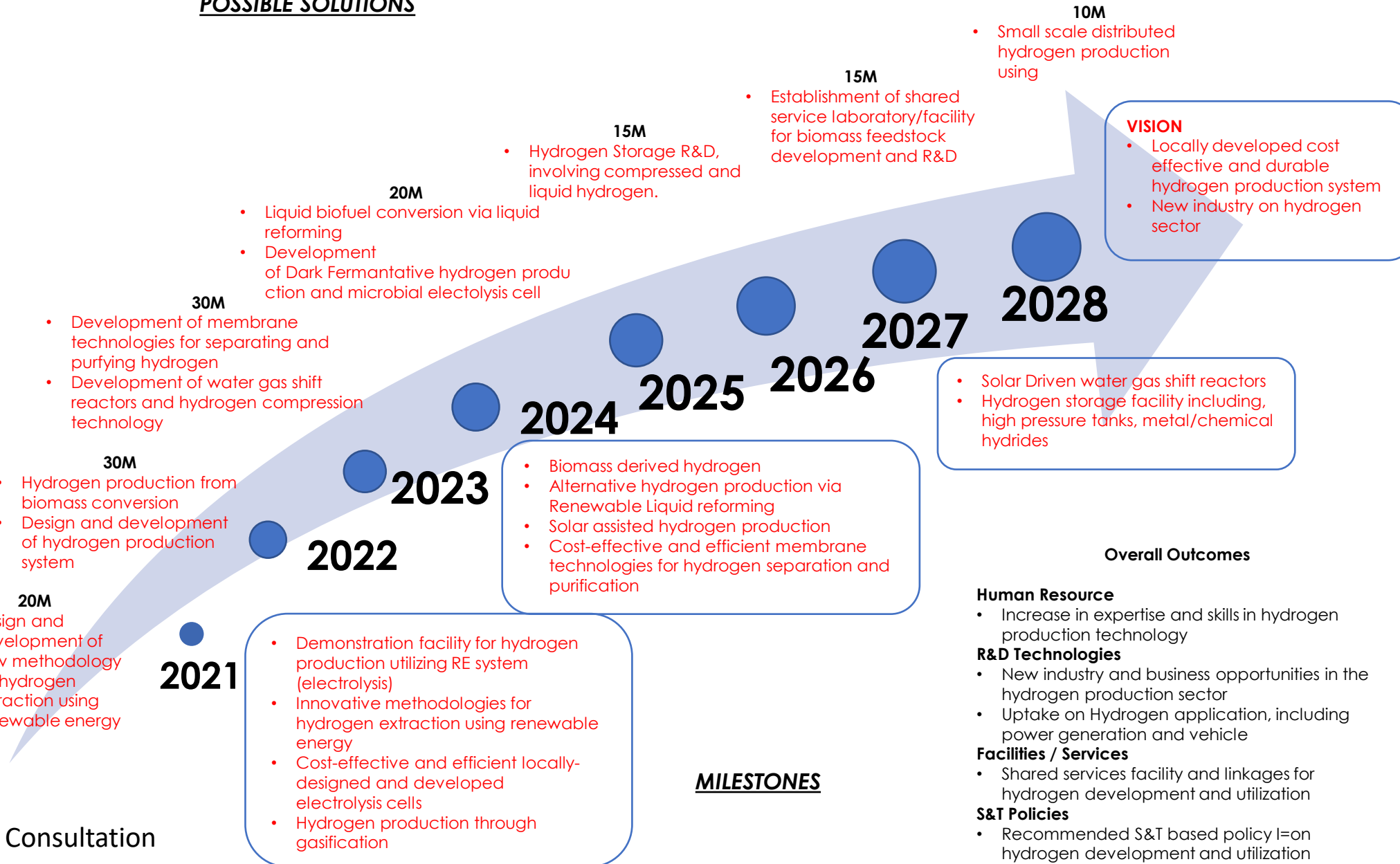
- Hydrogen production from biomass and other renewable sources
- Design and development of hydrogen production system
- Development of alternative storage of electricity from renewables to run electrolyzers to produce hydrogen on-site
- Development of cost effective and durable catalyst and membranes
- R&D on hydrogen storage and transport

Facilities / Services

- Establishment of shared service laboratory/facility for biomass feedstock development and R&D
- Hydrogen evaluation facility

S&T Policies

- Minimal Life Cycle Cost and environmental impact on hydrogen production strategy and projects



Overall Outcomes

Human Resource

- Increase in expertise and skills in hydrogen production technology

R&D Technologies

- New industry and business opportunities in the hydrogen production sector
- Uptake on Hydrogen application, including power generation and vehicle

Facilities / Services

- Shared services facility and linkages for hydrogen development and utilization

S&T Policies

- Recommended S&T based policy I=on hydrogen development and utilization

Overall Strategies

POSSIBLE SOLUTIONS

Human Resource

- Capacity building on ocean energy resource assessment/ ocean thermal energy conversion
- Capacity building on ocean turbine system services, repair and maintenance for project sustainability

R&D Technologies

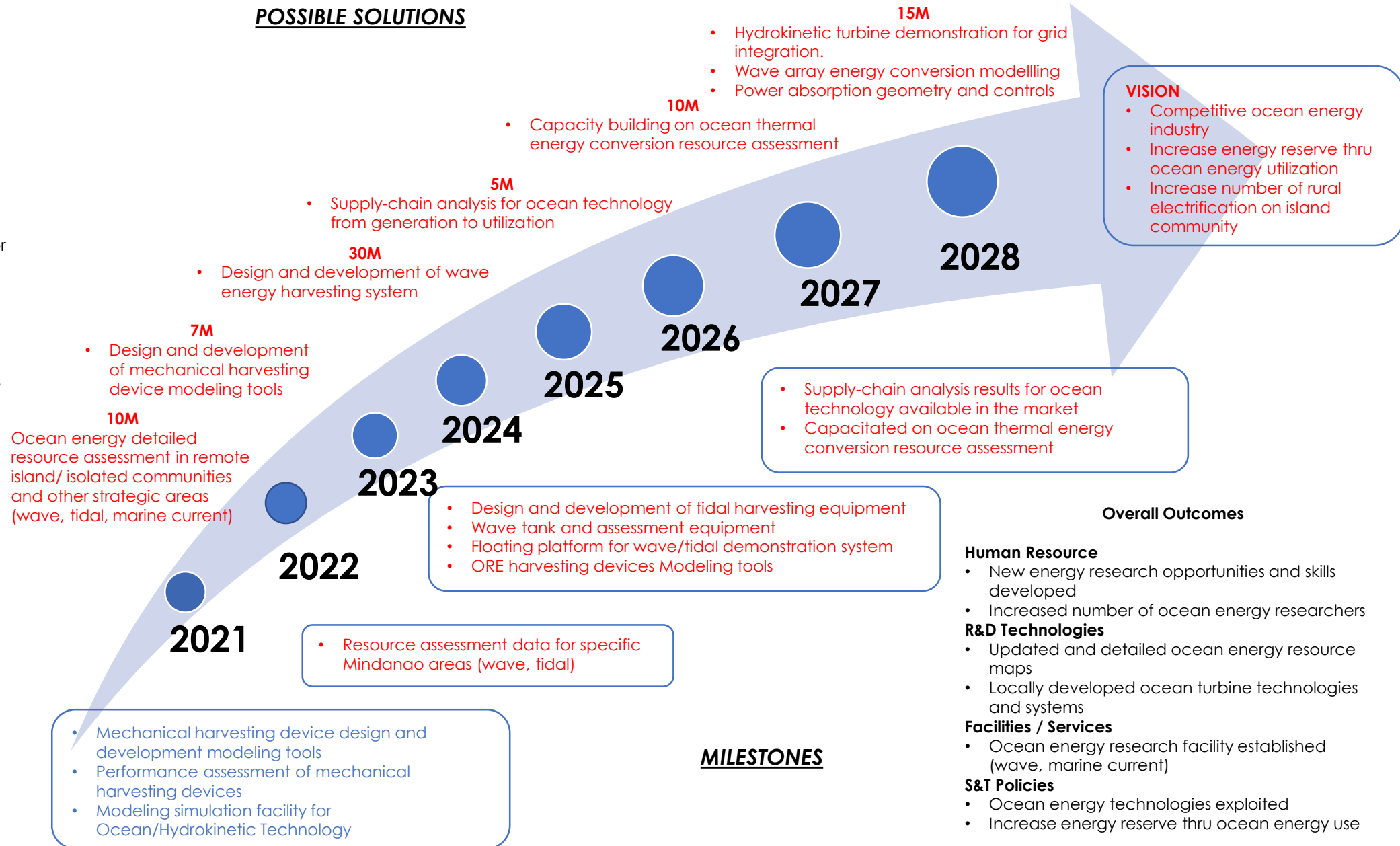
- Detailed resource assessment for remote island communities (wave, tidal, marine current)
- Design and development of mechanical harvesting device modeling tools
- Design and development of wave energy harvesting systems

Facilities / Services

- Establishment of ocean energy research facility (wave and marine current)

S&T Policies

- Development of S&T-based policies for ocean energy technology adoption



Overall Strategies

Human Resource

- Capacity building on small-wind micro-siting assessment tools development for hybrid applications
- Capacity building on BOS local development
- Improvement in turbine design, fabrication and manufacturing ability

R&D Technologies

- Design and development of micro-siting tools for small wind remote area applications
- Design and development of novel harvesting device for small-wind turbine system – modeling using laboratory level
- Design and development of wind turbine for hybrid offshore systems
- Improvement of turbine blade design

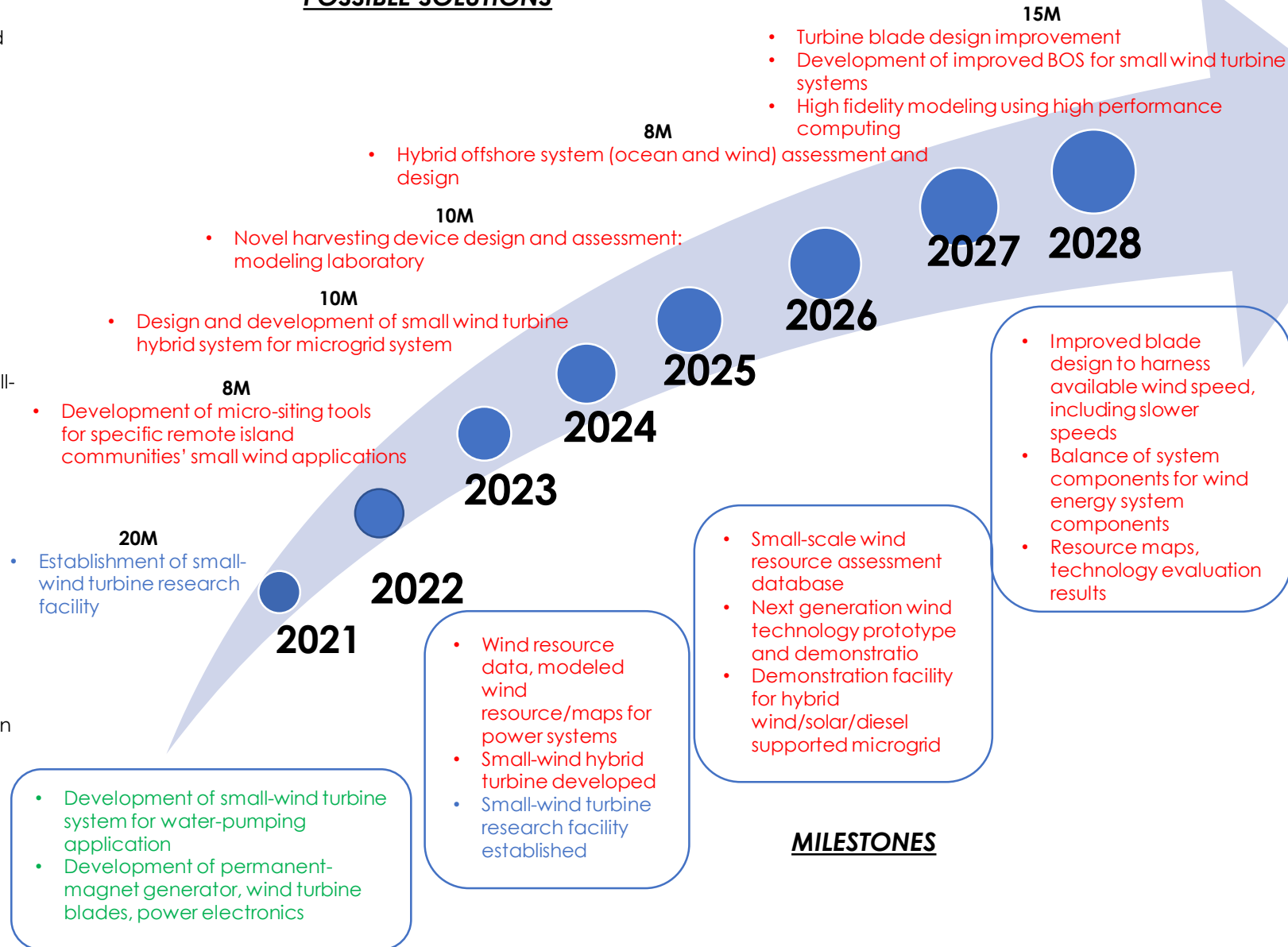
Facilities / Services

- Establishment of small-wind research facility
- Distributed wind energy system

S&T Policies

- Development of policy based on S&T project results conducted

POSSIBLE SOLUTIONS



VISION

- Competitive wind energy industry
- Sustainable wind energy systems
- Increased energy reserve thru renewable energy sources
- Improvement of energy system for the people

Overall Outcomes

Human Resource

- Capacitated on the development of small-wind micro-siting tools and balance-of-system (BOS)

R&D Technologies

- Increased number of small-wind energy applications for rural and urban areas
- New technology developed for off-shore wind applications

Facilities / Services

- Increased number of wind-turbine suppliers catered under the wind research facility

S&T Policies

- Policy recommendations on the use of hybrid microgrid system including small-wind turbine system

Overall Strategies

Human Resource

- Capacity building on solar PV and concentrator testing and validation
- Capacity building on solar PV/ concentrator repair services and maintenance for sustainability

R&D Technologies

- Development of forecasting model for solar installation and resources assessment
- Development of modular stand-alone mobile desalination unit for brackish and seawater
- Solar PV marine floating platform design optimization

Facilities / Services

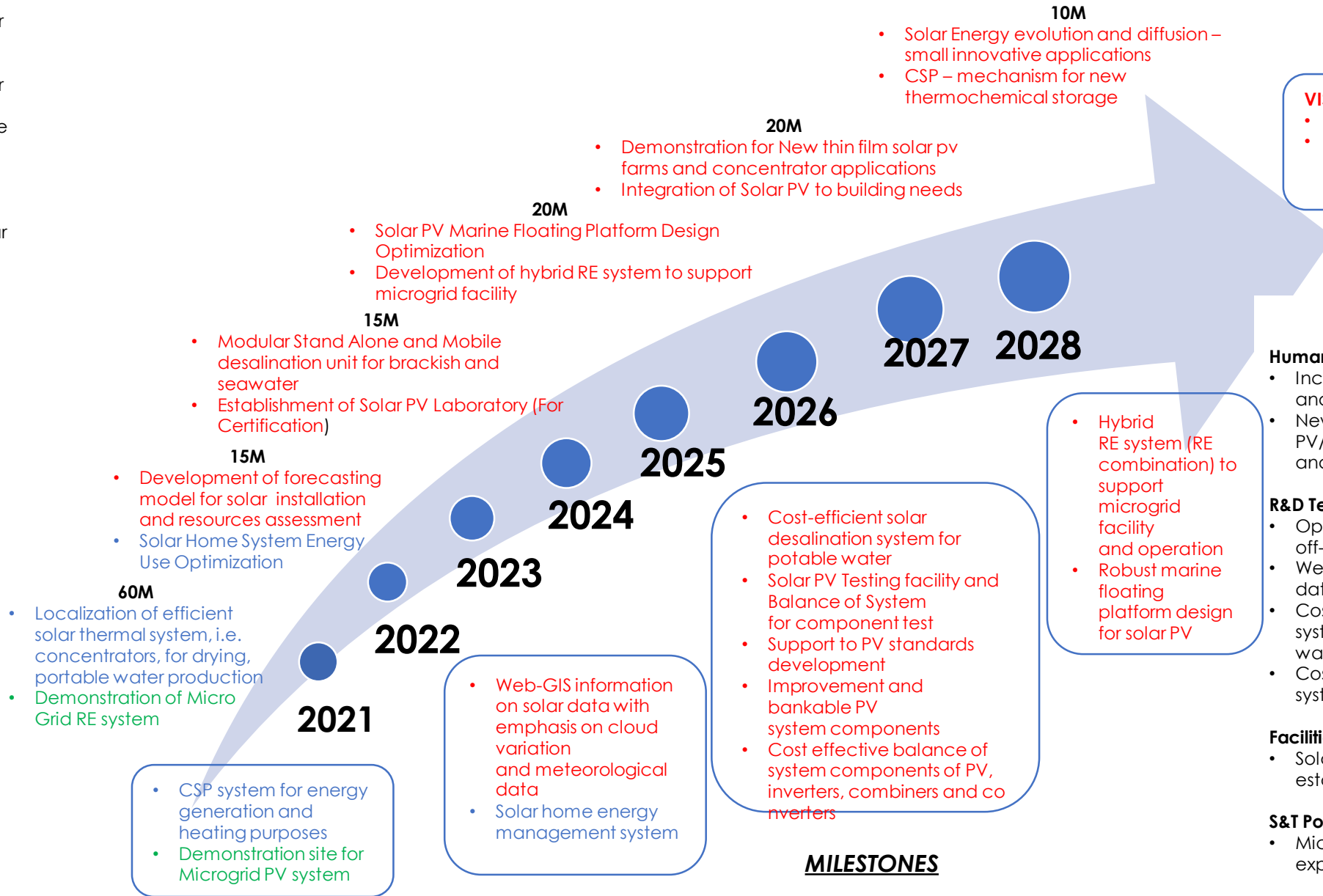
- Establishment of Solar PV laboratory (certification-type)

S&T Policies

- Recommendation of S&T-based policies to support microgrid RE utilization for off-grid/on-grid applications

Initial Draft – For
Sectoral
Consultation

POSSIBLE SOLUTIONS



VISION

- Competitive solar PV industry
- Energy reserve increased thru renewable energy for human utilization

Overall Outcomes

Human Resource

- Increased capacity on solar PV and concentrator testing services
- New skills acquired for solar PV/concentrator services, repair and maintenance

R&D Technologies

- Optimized solar home system for off-grid areas
- Web-GIS based information solar data established
- Cost-effective solar desalination system for additional potable water source developed
- Cost competitive balance-of-system (BOS)

Facilities / Services

- Solar PV and BOS testing facility established

S&T Policies

- Microgrid RE system using solar PV exploited for off-grid areas

MILESTONES

Energy : Waste To Energy Program

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Done

Ongoing

Not yet
Available

POSSIBLE SOLUTIONS

Overall Strategies

Human Resource

- Capacity building on hydrogen production using biomass technology

R&D Technologies

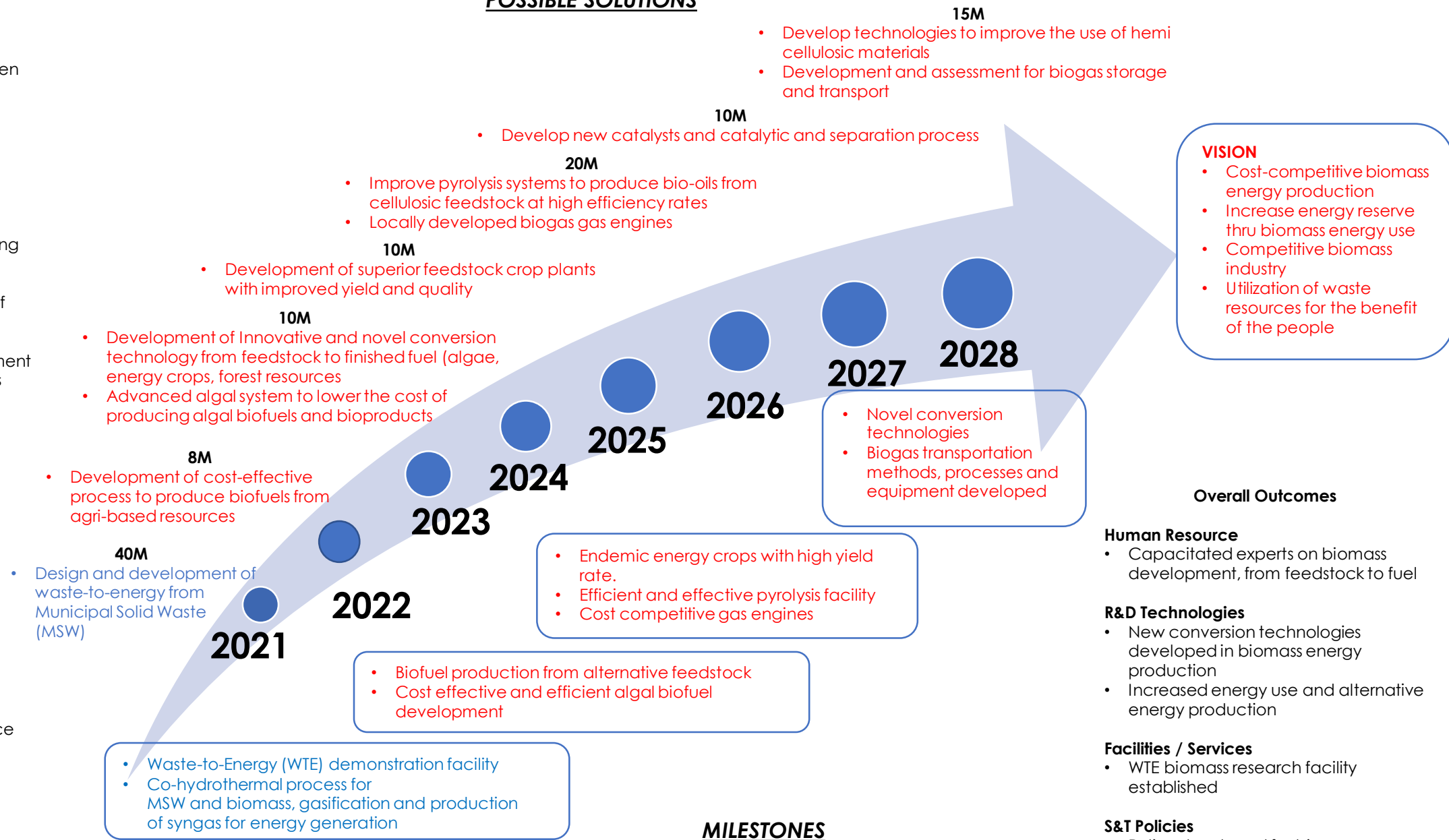
- Design and development of cost-effective process to produce biofuels from agri-based resources
- Hydrogen gas production using environmentally sound technologies
- Assessment and evaluation of Non-food and other possible energy crops
- Methods and Tools development for enhancing Waste Analysis and Characterization Study (WACS)

Facilities / Services

- Establishment of WTE demonstration facility
- Shared service facility for feedstock analysis and evaluation
- NICER facility for WTE

S&T Policies

- Development of S&T-based policies supporting biomass technology utilization
- Science Based approach on promotion of WTE facility, including emission compliance



Microgrid Renewable Energy R&D Roadmap

Legend (Text Font):	Done	Ongoing	Not yet Available
NAST Foresight			
Thematic Area			
Geographical			

Overall Strategies

Human Resource

- Capacity building on microgrid renewable energy operation, maintenance, and sustainability (end-users and technology adoptors)
- Capacity building on microgrid services i.e. parts and components outsourcing, repair services, etc.

R&D Technologies

- Design and development of cost-effective balance-of-systems (BOS)
- Demand side management development
- Design and development of energy optimization tools
- Design and development of microgrid RE with energy storage system
- Integration of data analytics for optimum energy use
- Demand-side management development
- Supply-chain analysis (generation, transmission, distribution, utilization)

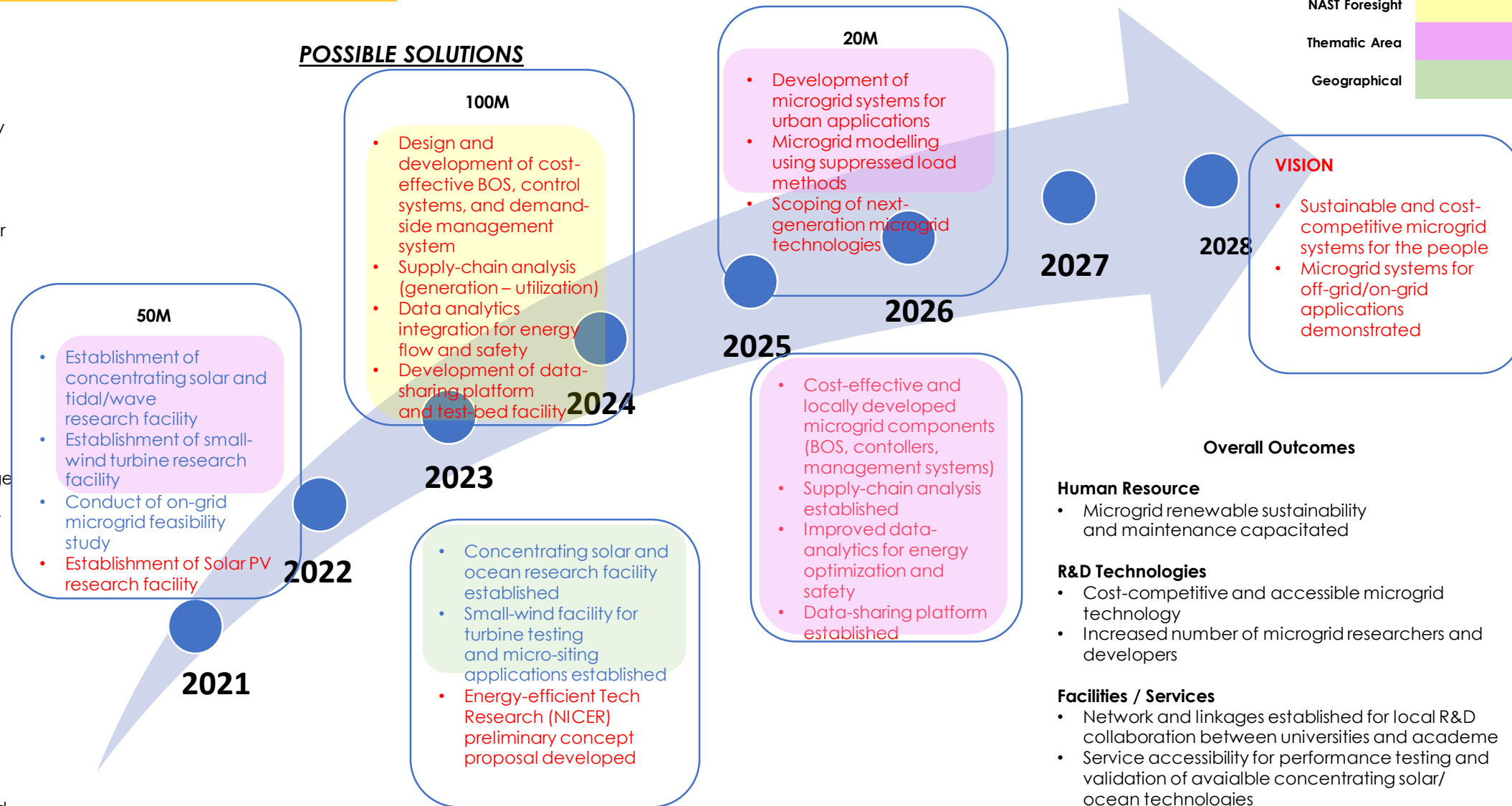
Facilities / Services

- Establishment of solar and ocean research facility
- Establishment of small-wind turbine research facility
- Development of data-sharing platform and microgrid test-bed research facility

S&T Policies

- Development of policy recommendations for microgrid technology use i.e. incentives, support facilities, tariffs, etc.

POSSIBLE SOLUTIONS



Overall Outcomes

Human Resource

- Microgrid renewable sustainability and maintenance capacitated

R&D Technologies

- Cost-competitive and accessible microgrid technology
- Increased number of microgrid researchers and developers

Facilities / Services

- Network and linkages established for local R&D collaboration between universities and academe
- Service accessibility for performance testing and validation of available concentrating solar/ocean technologies

S&T Policies

- Recommended S&T-based policy on the use of microgrid systems both for off-grid and on-grid settings

MILESTONES

Energy Storage R&D Roadmap

Legend
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	Done	Ongoing	Not yet Available
NAST Foresight			
Thematic Area			
Geographical			

Overall Strategies

Human Resource

- Hiring of experts and consultants for energy storage development
- New battery architecture training and development
- Indigenous material assessment
- Design, development, and simulation program/experts
- Training on energy storage assessment/evaluation
- Establishment/organizing energy storage system association

R&D Technologies

- New and emerging energy storage system technologies
- Analysis of industry and energy storage stakeholders
- Development of chemical, electrochemical, and mechanical energy storage systems
- Development of standards and testing procedure/protocol for energy storage system
- Local material utilization for battery systems
- Household integration of energy storage systems

Facilities / Services

- Energy storage R&D facility and innovation center
- Indigenous materials for energy storage assessment and evaluation facility
- Energy storage system test facility

S&T Policies

- Development of S&T-based policies for energy storage technologies

POSSIBLE SOLUTIONS

