



# Nuclear energy in ASEAN's decarbonisation and its implication on regional cooperation

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**One Community  
for Sustainable  
Energy**



# Introduction

Established on 1 January 1999, the ASEAN Centre for Energy (ACE) is an intergovernmental organisation within the Association of Southeast Asian Nations' (ASEAN) structure that represents the 10 ASEAN Member States' (AMS) interests in the energy sector.



ACE shall accelerate the integration of **energy strategies** within ASEAN by providing relevant information and expertise to ensure the necessary energy policies and programmes are in **harmony** with the **economic growth** and the **environmental sustainability** for the region.



## Catalyst

To unify and strengthen ASEAN Energy Cooperation by providing:

- Platform for Sharing
- Policy Advisory
- Best Practices
- Capacity Building



## Knowledge Hub

To provide a knowledge repository for ASEAN Member States (AMS) and services through:

- Data Management
- Publication
- Dissemination



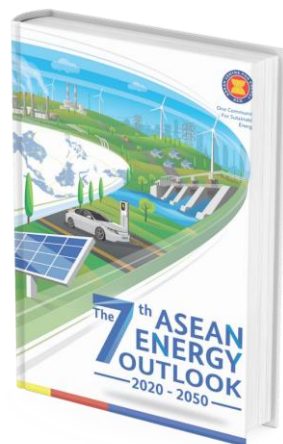
## Think tank

To assist AMS on research and identifying practical & specific solution on:

- Policies
- Legal & Regulatory Frameworks
- Technologies
- Innovative Solutions

# Newly launched Outlook explored multiple decarbonisation paths

Historical data from 2005 - 2020 are projected to 2021 - 2050 on four scenarios.



## The four scenarios of AEO



### Baseline Scenario

The energy growth pattern kept at constant level as of last historical year



### AMS Targets Scenario (ATS)

Achievement of ASEAN official national energy targets



### APAEC Targets Scenario (APS)

Achievement of APAEC's aspirational regional targets on RE and EI



### Least-Cost Optimisation (LCO)

Least-cost power sector dispatch to attain APAEC's regional targets

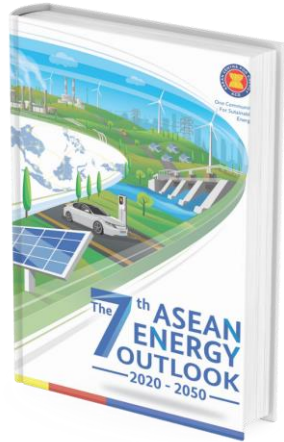
Increase ambitions of RE and EE/EI standards

Least-cost option in power sector

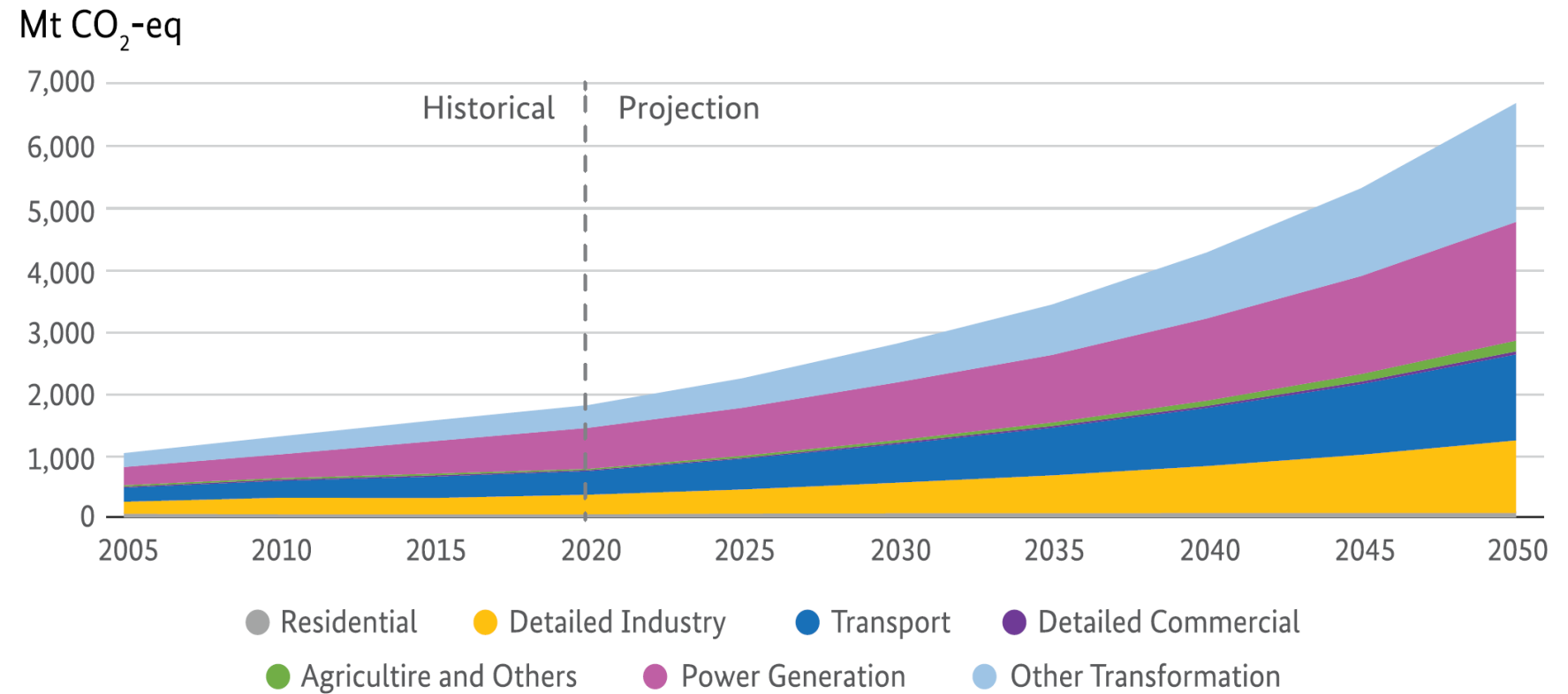
The ambition level escalates from Baseline Scenario to APS, while the LCO Scenario serves an alternative scenario that considers all the viable technologies in the region in determining the Power generation mix that would meet the region's electricity demand while satisfying the APAEC's regional target.



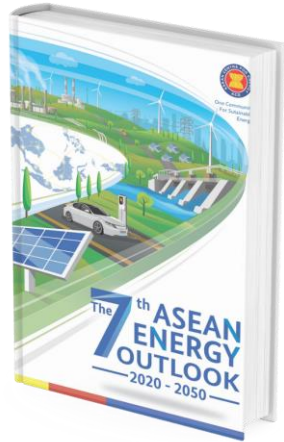
# Without new policies, ASEAN's GHG emissions will increase 3.7-fold



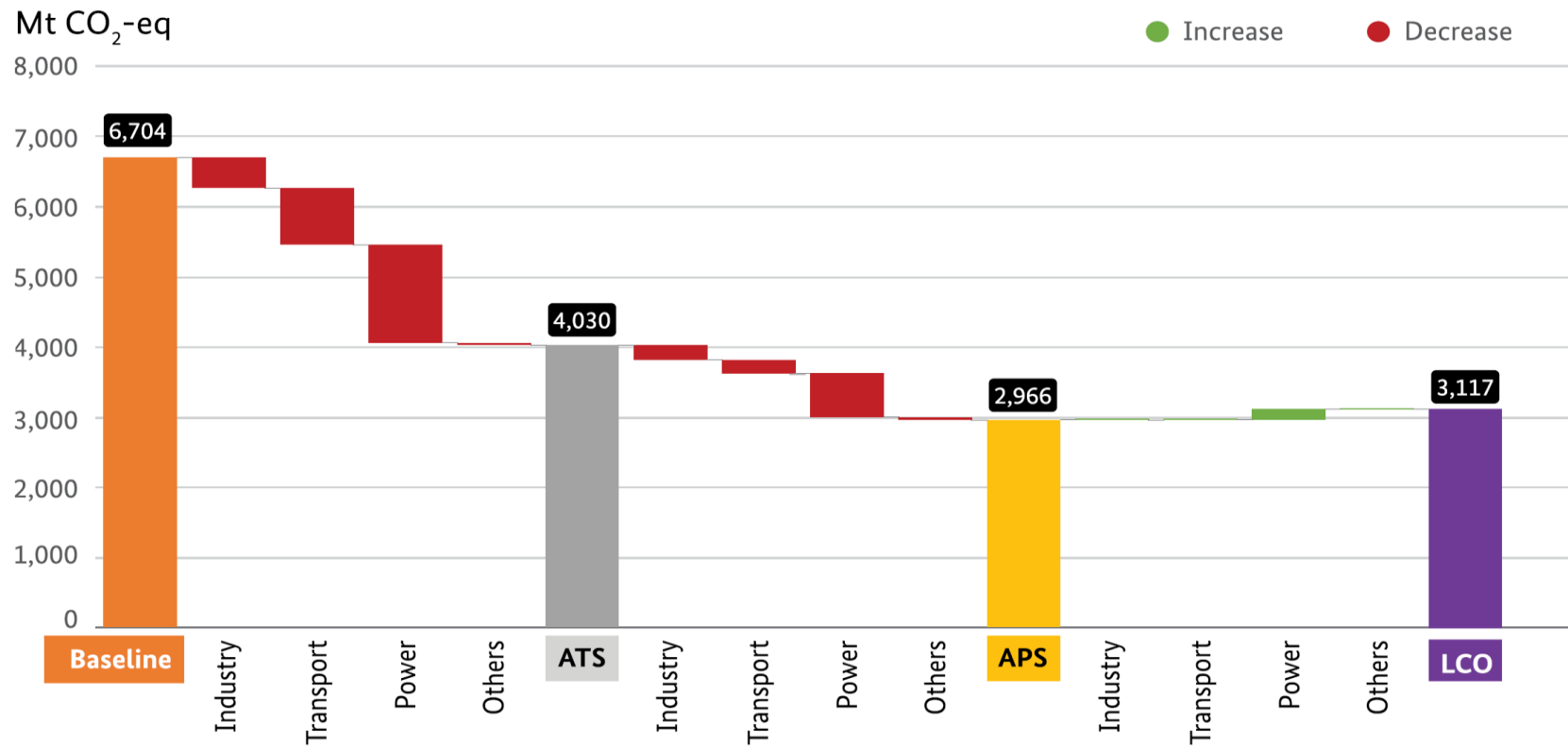
GHG Emissions Produced by Sector, Baseline Scenario



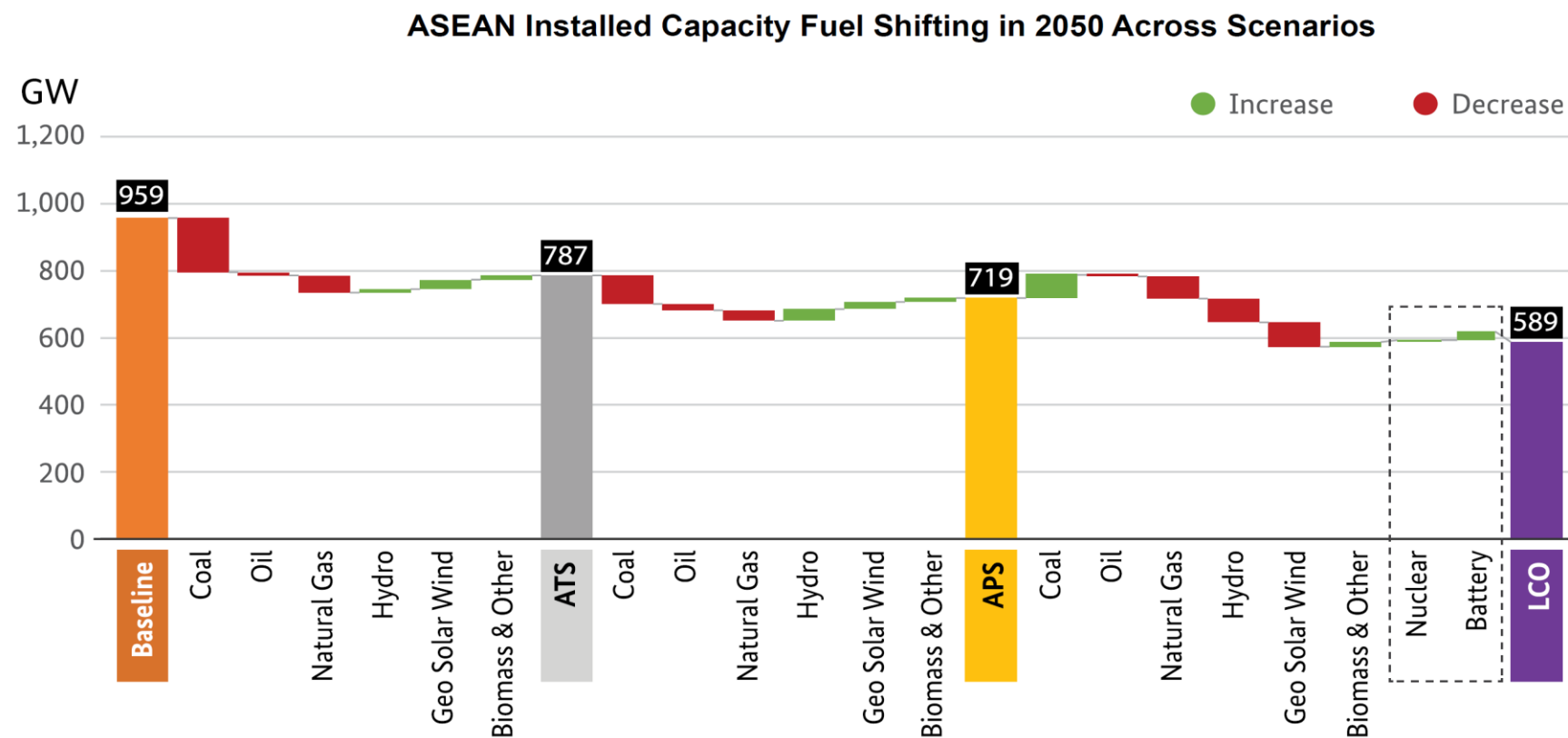
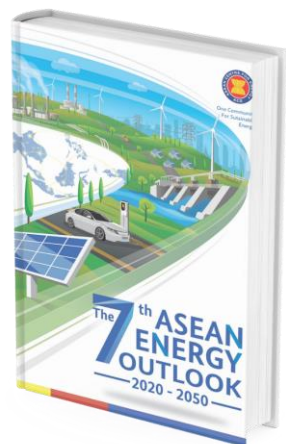
# Power sector is the most potential emission reduction



GHG Emissions Reduction by Sector in 2050 Across Scenarios

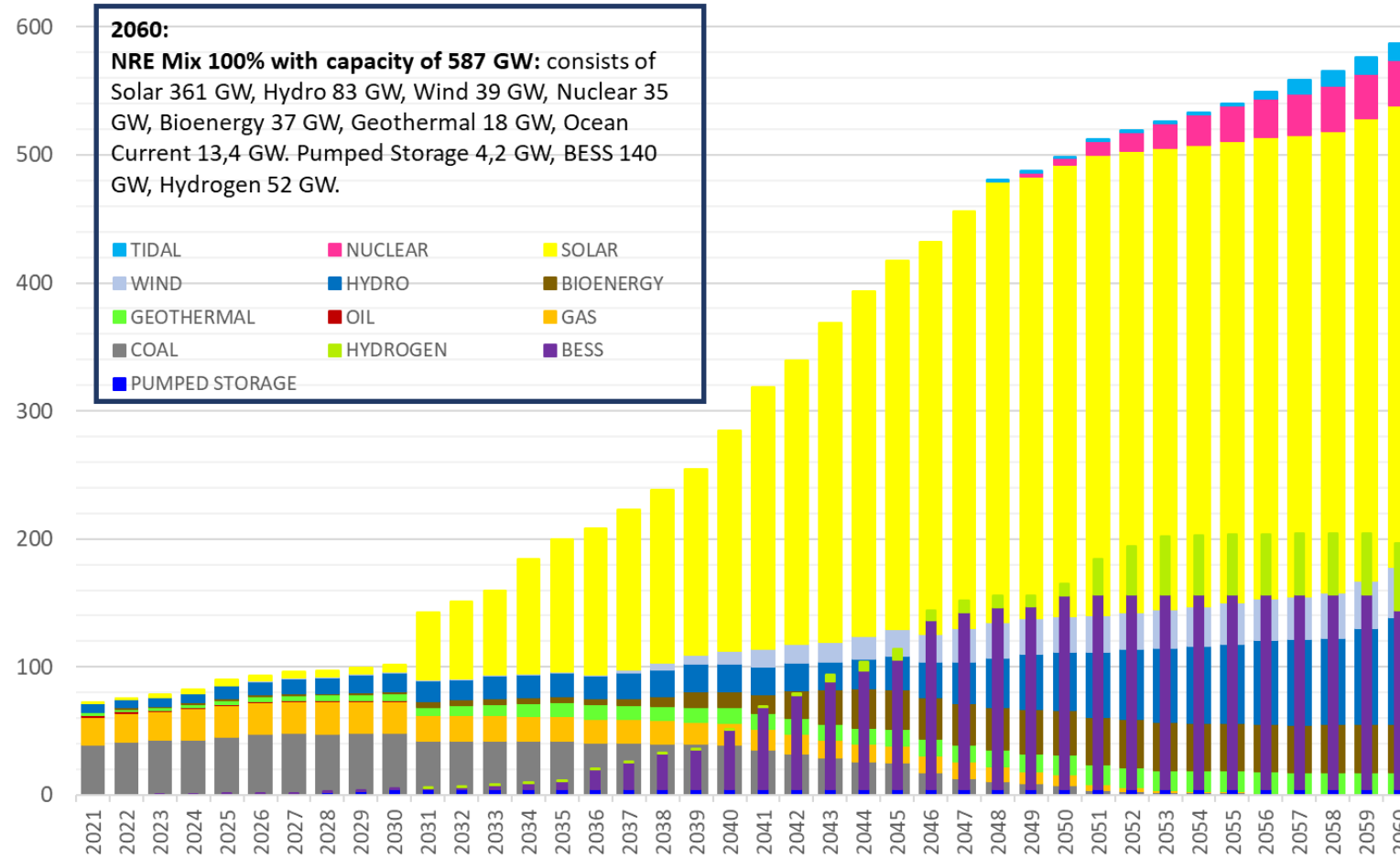


# Renewable is the major contributor, but nuclear will play a role



# Sample case: nuclear in Indonesia NZE Roadmap

Capacity : Giga Watt



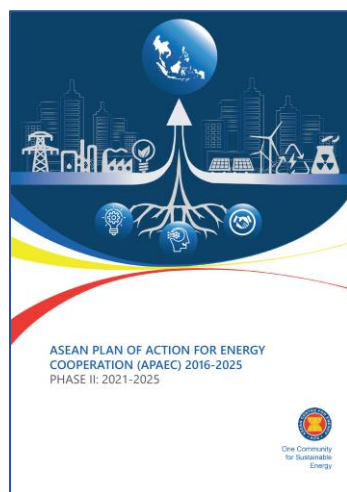
- Coal/Gas PP:** No additional CFPP unless contracted/under construction. PLN CFPP will be retired earlier than asset revaluation. IPP CFPP retired after PPA ends. Gas PP retired after 30 years (residual < 1 GW, CFPP: 2057, Gas PP: 2054)
- NRE:** Additional power plant after 2030 will only come from NRE. Starting from 2035, will be dominated by Variable Renewable Energy (VRE) in form of Solar PP, followed by Wind PP and Ocean Current PP in the following year.
- Geothermal PP:** Maximized up to 75% of potential.
- Hydro PP:** Will be maximized and sent to load center in other islands. Serves to balance VRE power plants.
- STORAGE:** Pumped storage start in 2025, Battery Energy Storage System (BESS) massively used in 2021. Hydrogen will be utilized gradually starting from 2031 and massively by 2051.
- Nuclear PP:** Enter system in 2049 to maintain system reliability and will reach 35 GW by 2060.










# Regional blueprint for the energy cooperation

## ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025 Phase 2: 2021-2025

- Theme: *“Enhancing Energy Connectivity and Market Integration in ASEAN to Achieve Energy Security, Accessibility, Affordability and Sustainability for All.”*
- Sub-theme: *“Accelerating Energy Transition and Strengthening Energy Resilience through Greater Innovation and Cooperation.”*



 <b>ASEAN Power Grid</b>	<p>To expand regional multilateral electricity trading, strengthen grid resilience and modernisation, and promote clean and renewable energy integration.</p>	 <b>Energy Efficiency and Conservation</b>	<p>To reduce energy intensity by 32% in 2025 based on 2005 levels and encourage further energy efficiency and conservation efforts, especially in transport and industry sectors.</p>
 <b>Trans-ASEAN Gas Pipeline</b>	<p>To pursue the development of a common gas market for ASEAN by enhancing gas and LNG connectivity and accessibility.</p>	 <b>Renewable Energy</b>	<p>To achieve aspirational target for increasing the component of renewable energy to 23% by 2025 in the ASEAN energy mix, including through increasing the share of RE in installed power capacity to 35% by 2025.</p>
 <b>Coal and Clean Coal Technology</b>	<p>To optimise the role of clean coal technology in facilitating the transition towards sustainable and lower emission development.</p>	 <b>Regional Energy Policy and Planning</b>	<p>To advance energy policy and planning to accelerate the region's energy transition and resilience.</p>
		 <b>Civilian Nuclear Energy</b>	<p>To build human resource capabilities on nuclear science and technology for power generation.</p>



# CNE programme focuses on building human resource capabilities

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