

# **A Future for Coal in Power Generation**

**Panel – How to Support Sustainable Use of Coal**

**2017 US-China Clean Coal Industry Forum  
Morgantown, WV**

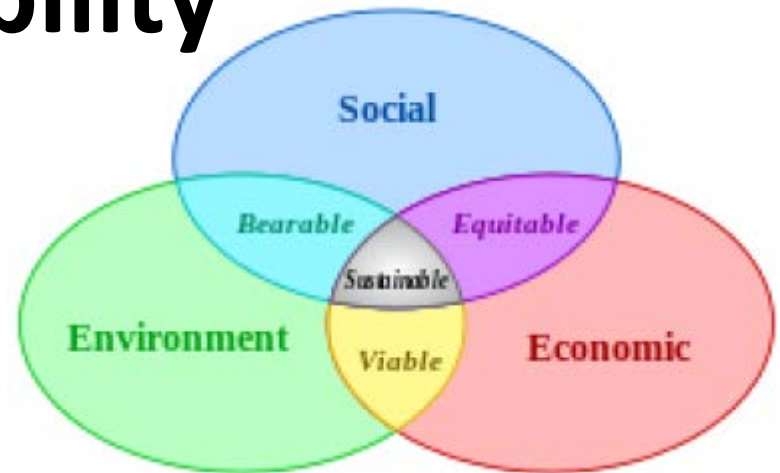
**Nov.30 – Dec.1, 2017**

**John Marion**

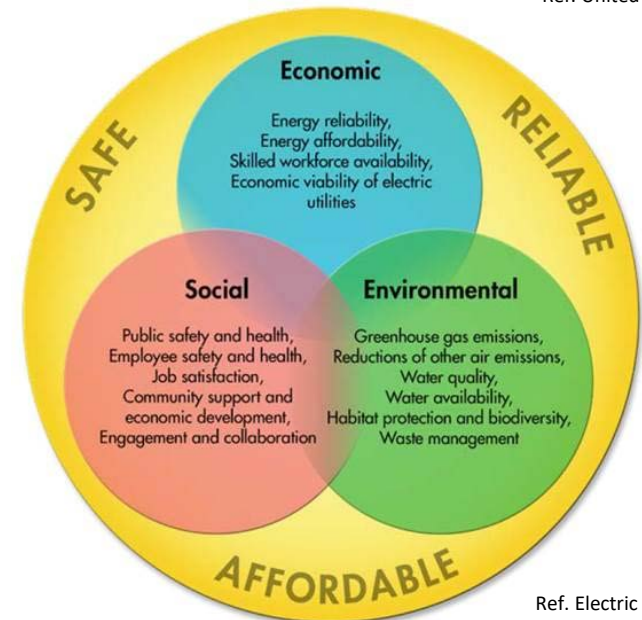
Management & Technology Consultant

# Sustainability

- “Sustainability” is humanity’s target goal of human-ecosystem equilibrium (homeostasis)
- “Sustainable development” refers to holistic approaches that lead to that end point
- Three balanced pillars: economy, society, and environment
- For electric utilities sustainability is a dynamic concept encompassing “corporate responsibility”, “corporate social responsibility”, “environmental governance”, and “stewardship” – EPRI Sustainability Interest Group
- EPRI defines corporate sustainability as business strategy that incorporates and balances the three pillars



Ref. United Nations



Ref. Electric Power Research Institute

# UN Sustainability Goals



## Goal 7 – Affordable & Clean Energy – by 2030

- Ensure universal access to affordable, reliable and modern energy services
- Increase substantially the share of renewable energy in the global energy mix
- Enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency, and advanced cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology
- Expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries

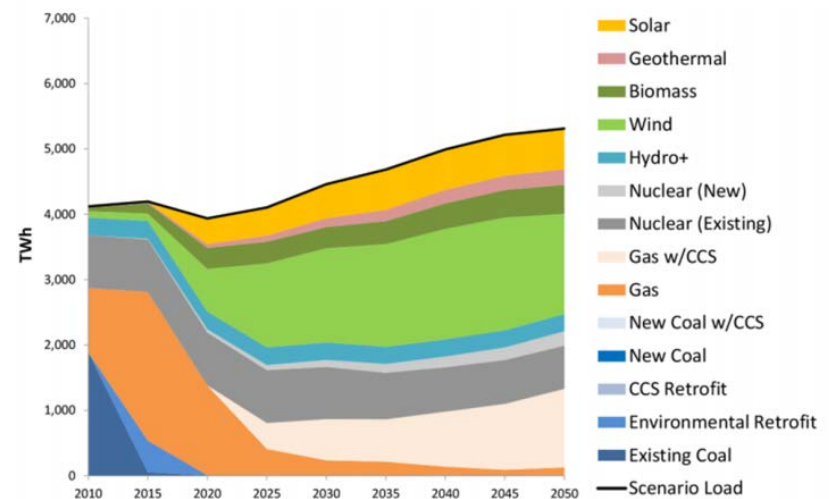


Fossil power is required in foreseeable future to balance goals of society & economy

# Coal in Balanced Generation Portfolio

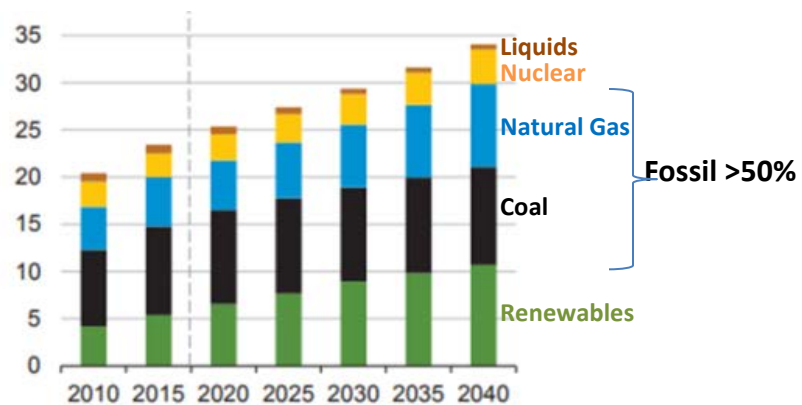
- **Least Risky**
- **Least Costly**
  - Maintains competition of resources and allows arbitrage
- **Most Reliable**
  - Most able to weather supply disruptions
- **Forecast of leading groups; IEA, EIA**
  - Fossil generation generally agreed outlook for 21<sup>st</sup> century
  - Too much value (\$) in fossil resources to not utilize – USA, China, global

Lowest Cost Generation Mix for Deep Decarbonization  
80% Cap with Banking – EPRI 2017



World net electricity generation by fuel – EIA WEO 2016

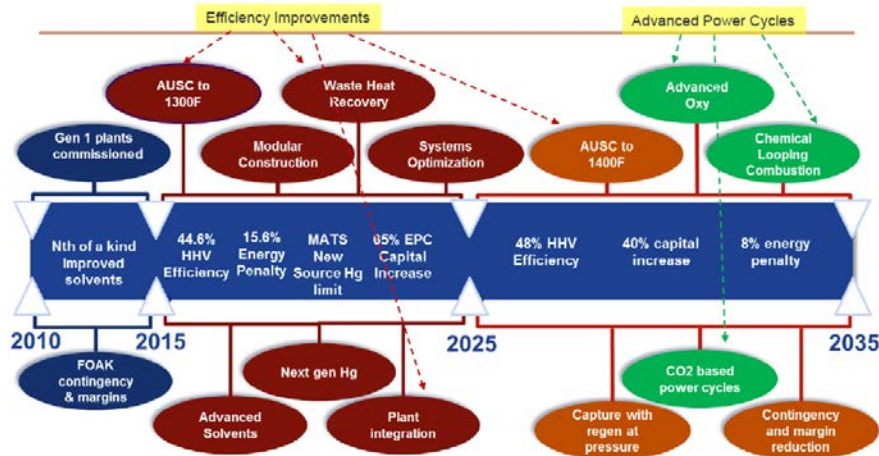
Trillion kilowatt-hours



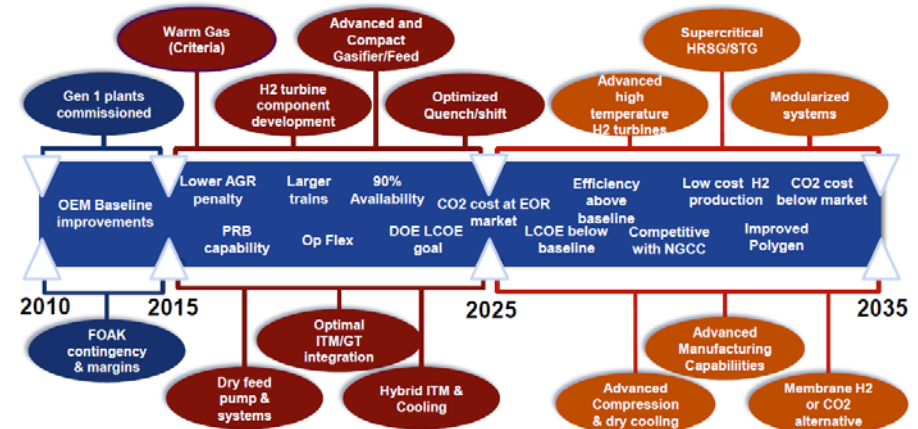
# Considerations for Sustainable Coal Power

- **We need to maintain the coal supply, delivery, and generation industry, infrastructure, and knowledge today, for sustainable coal in our future**
- **Maintain and improve the current power plant fleet**
- **Efficiency of generation should be a no regrets action for today's and tomorrow's fleet**
- **Future generation needs improved environmental performance and CCUS**
- **Continuity of support is needed for development**
- **Exploit synergy in development of those technologies that support both coal and NG utilization and both utility and industrial applications**

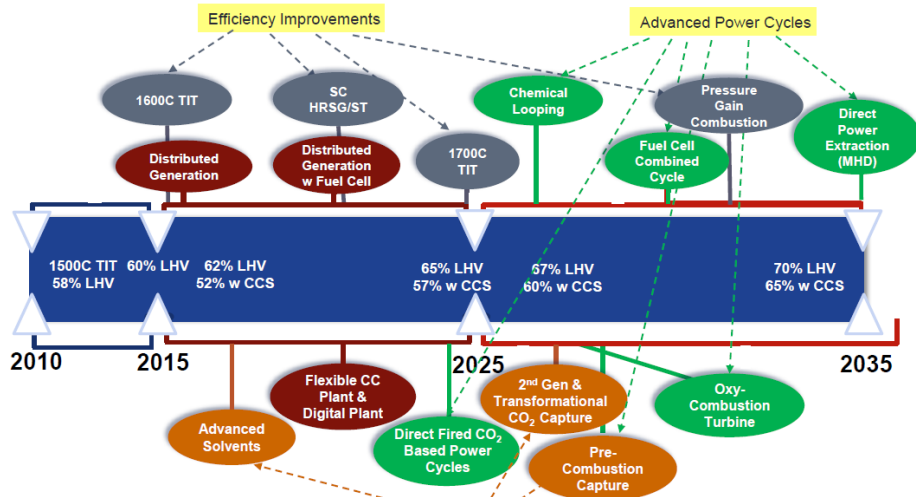
# Roadmap for Sustainable Coal



Transformational Coal Power Technologies



Gasification Technologies



Gas Power Technologies

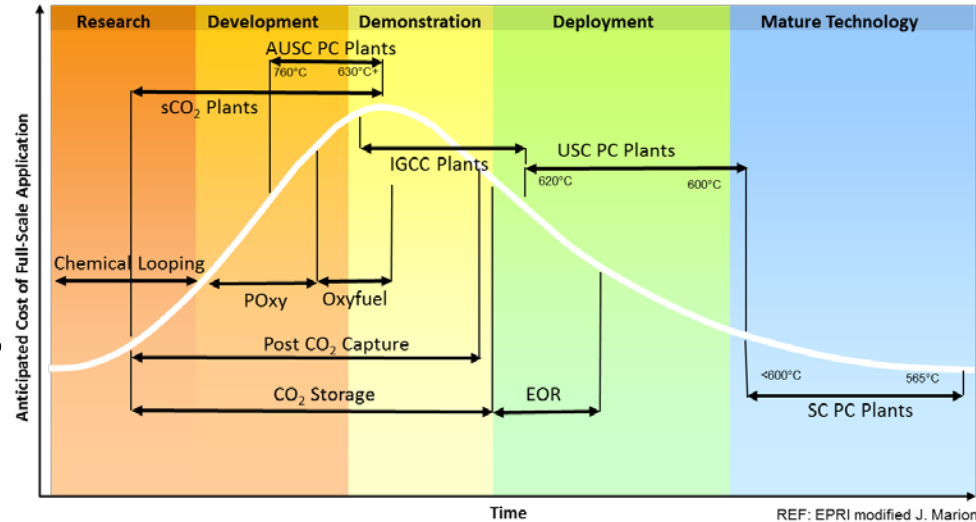
[www.curc.net](http://www.curc.net)

Funding (\$M/year)		2016-20	2021-25	2026-35
R&D	Total (Industry and Federal)	261	126	38
	Federal (80%)	209	101	30
Pilots	Total (Industry and Federal)	389	431	131
	Federal (80%)	311	345	105
Demos	Total (Industry and Federal)	128	1070	1018
	Federal (50%)	64	535	509
Total (Public/Private) Annual Funding		778	1627	1187
Annual Federal Budget		584	980	644

US-China CCIF 2017 - J. Marion

# USA – China Collaboration

- Pool competencies
- Pool investments
- Avoid redundancies
- Seek Win-Win
  - Transparent needs & wants
    - Government
    - Industry
    - Other stakeholders
- Clarity on project scope and division
  - Address National interests and perceptions
- Early consideration of IP rights
- Clarity of follow-on business and national objectives



Anticipated costs vary with technology maturity creating a challenge to overcome high costs prior to commercial deployment



# Summary

- **Coal power generation must be included to achieve sustainable development in the 21<sup>st</sup> century**
- **A balanced generation portfolio with coal is in best interest of society, economy, environment**
- **Need to maintain and improve the existing fleet coincident with work towards an improved future fleet**
- **We should agree and follow a stakeholder consensus Roadmap for improving the existing plants and developing the next generation, including CCUS, such as is given by the CURC**
- **Policies and support are needed to achieve the roadmap and to maintain a balanced generation portfolio**
- **US-China collaboration is warranted**