



# Developing a Common Vision for the Grid of the Future

DIREC 2010 – NEDO Side Event:  
Smart Grid Technology Seminar

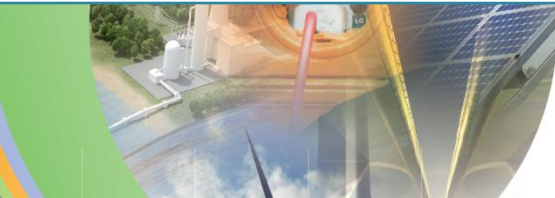
*October 27, 2010*

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# Outline

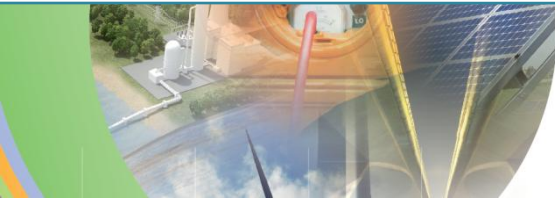
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- **Why do we need Smart Grids?**
- **Smart Grid Roadmap**
- **Preview to roadmap key messages**



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# WHY DO WE NEED THE SMART GRID?



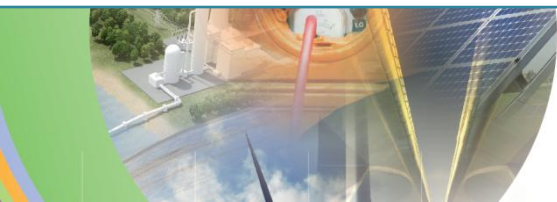
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# Regional Electricity Demand is Increasing

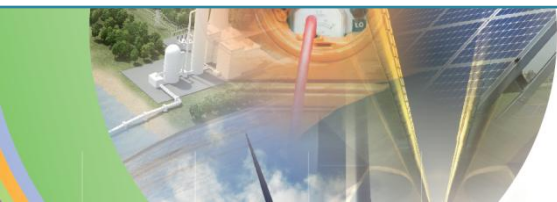
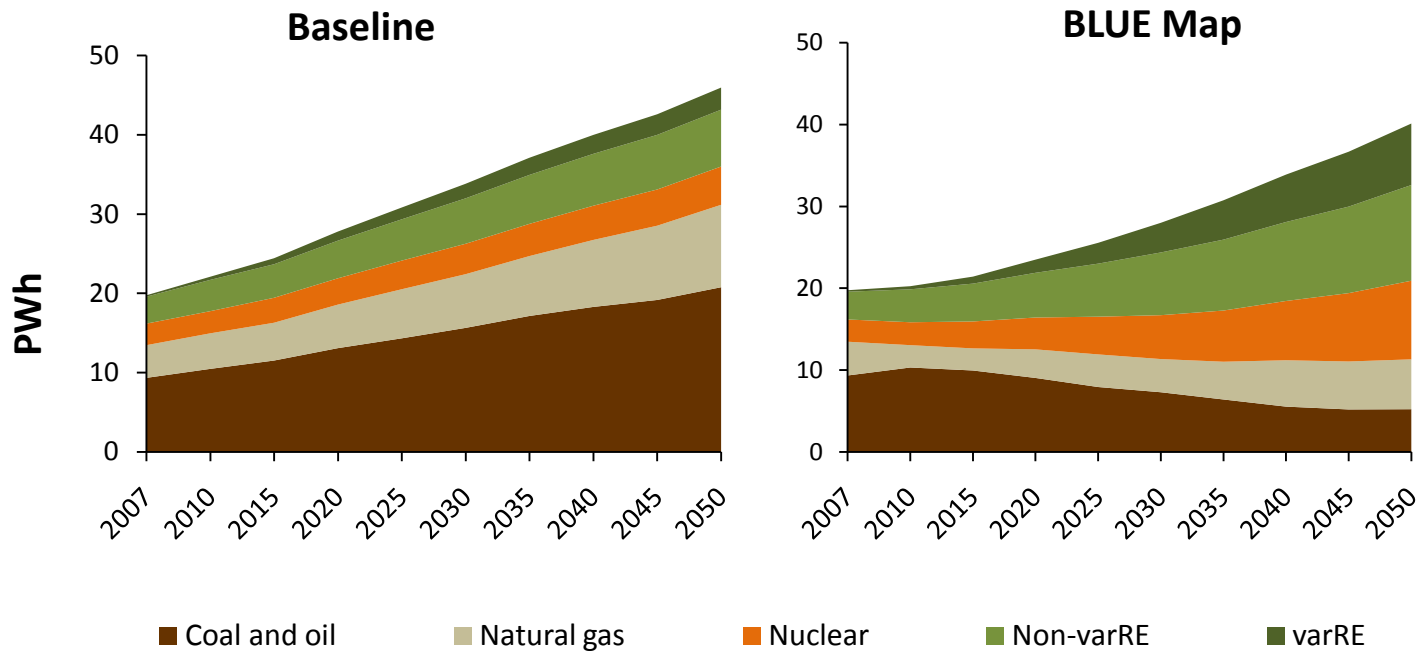
	2007 Electricity demand [TWh]	2050 BLUE Map Electricity demand [TWh]	BLUE Map Percent growth 2007 to 2050
<b>World</b>	16 999	36 948	117%
<b>OECD North America</b>	4 664	6 252	34%
<b>OECD Europe</b>	3 136	4 071	30%
<b>OECD Pacific</b>	1 681	2 311	37%
<b>Economies in Transition</b>	1 149	2 348	104%
<b>China</b>	2 856	9 500	233%
<b>India</b>	567	3 453	509%
<b>Other Developing Asia</b>	853	2 822	231%
<b>Africa</b>	521	1 691	225%
<b>Latin America</b>	808	2 062	155%
<b>Middle East</b>	594	2 437	310%

*Note: Electricity demand equals generation minus losses.*



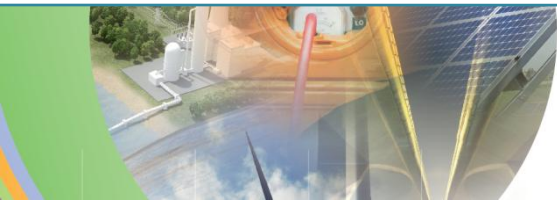
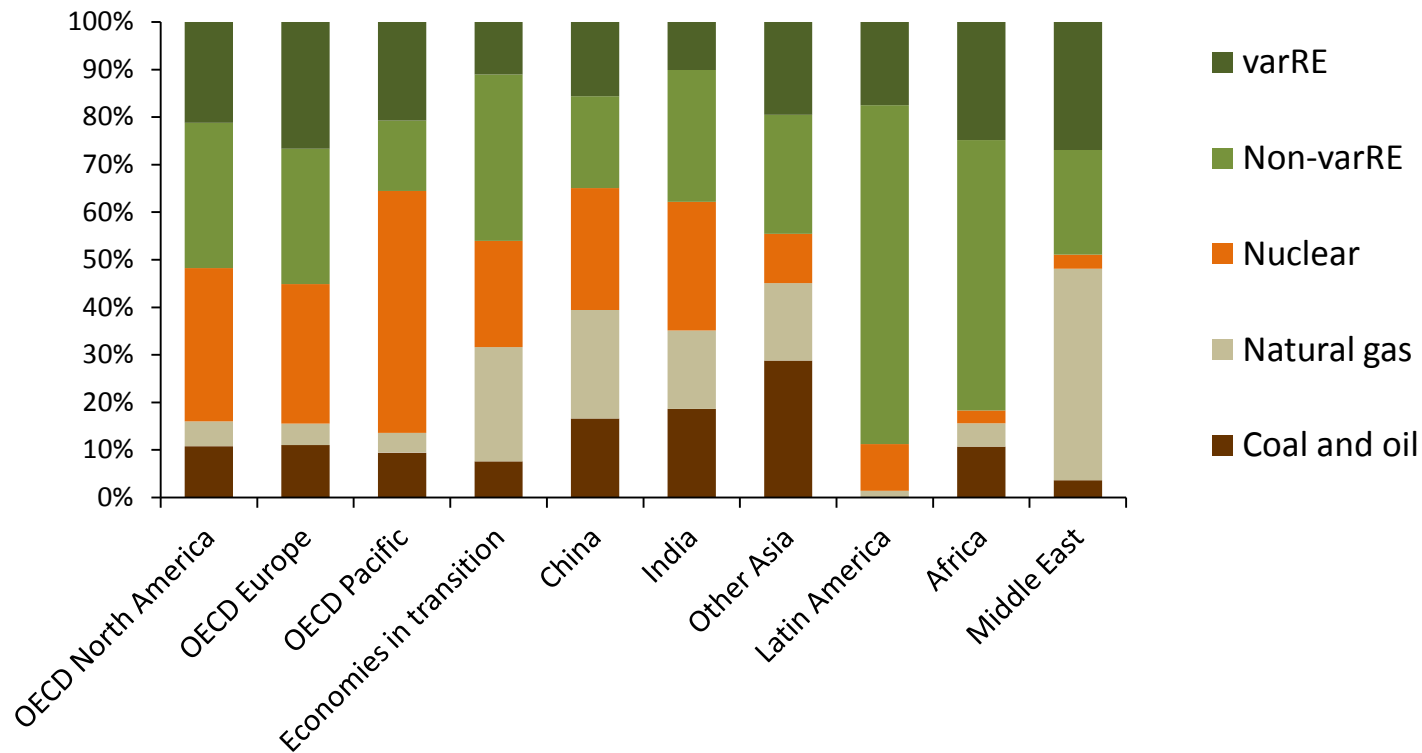
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# A Changing Global Electricity Generation Mix



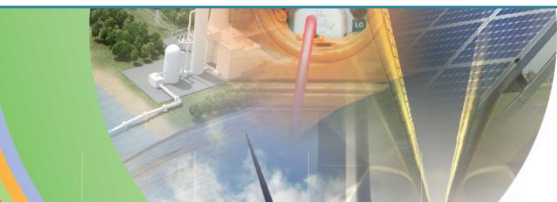
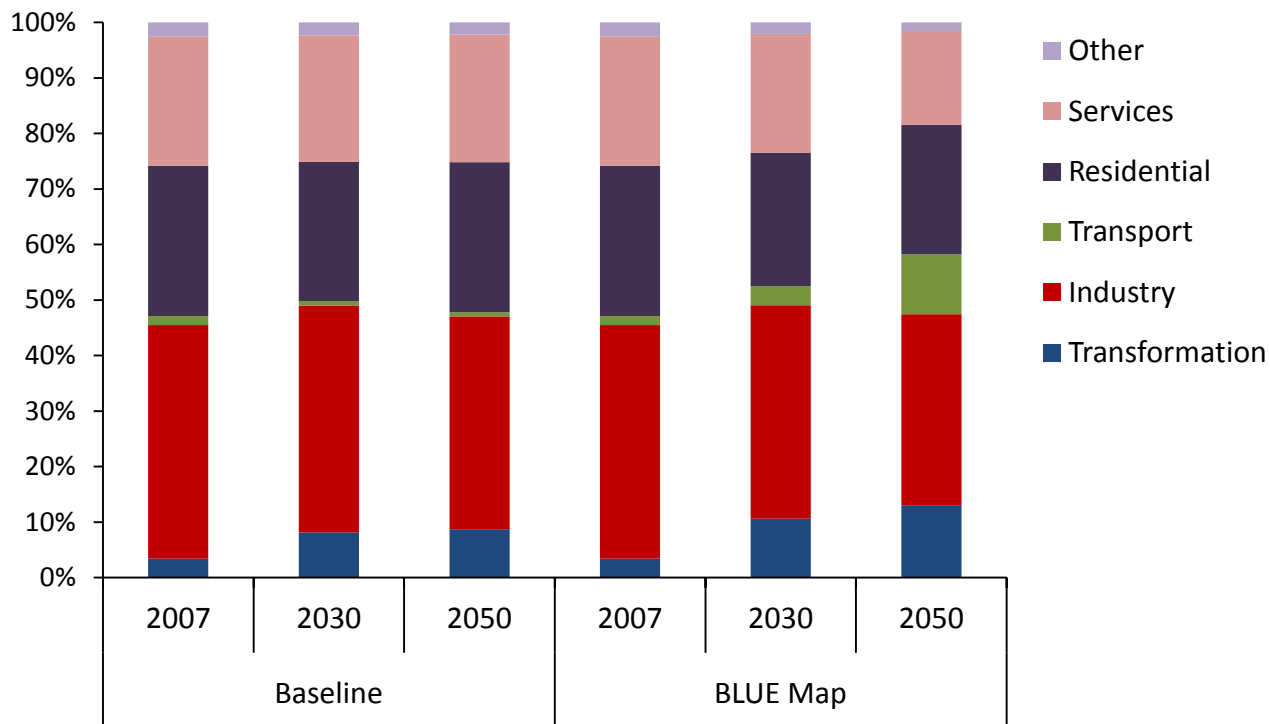
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# 2050 Blue Map Regional Generation Mix



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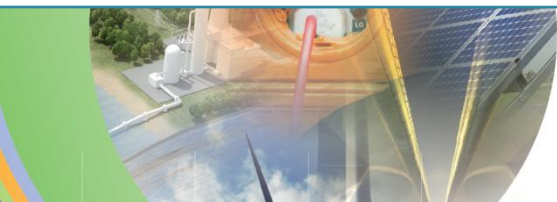
# Changing Global Sectoral Electricity Demand



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# Electricity System Losses - 2007

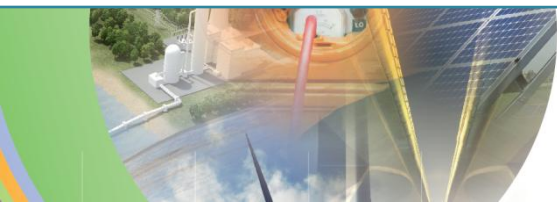
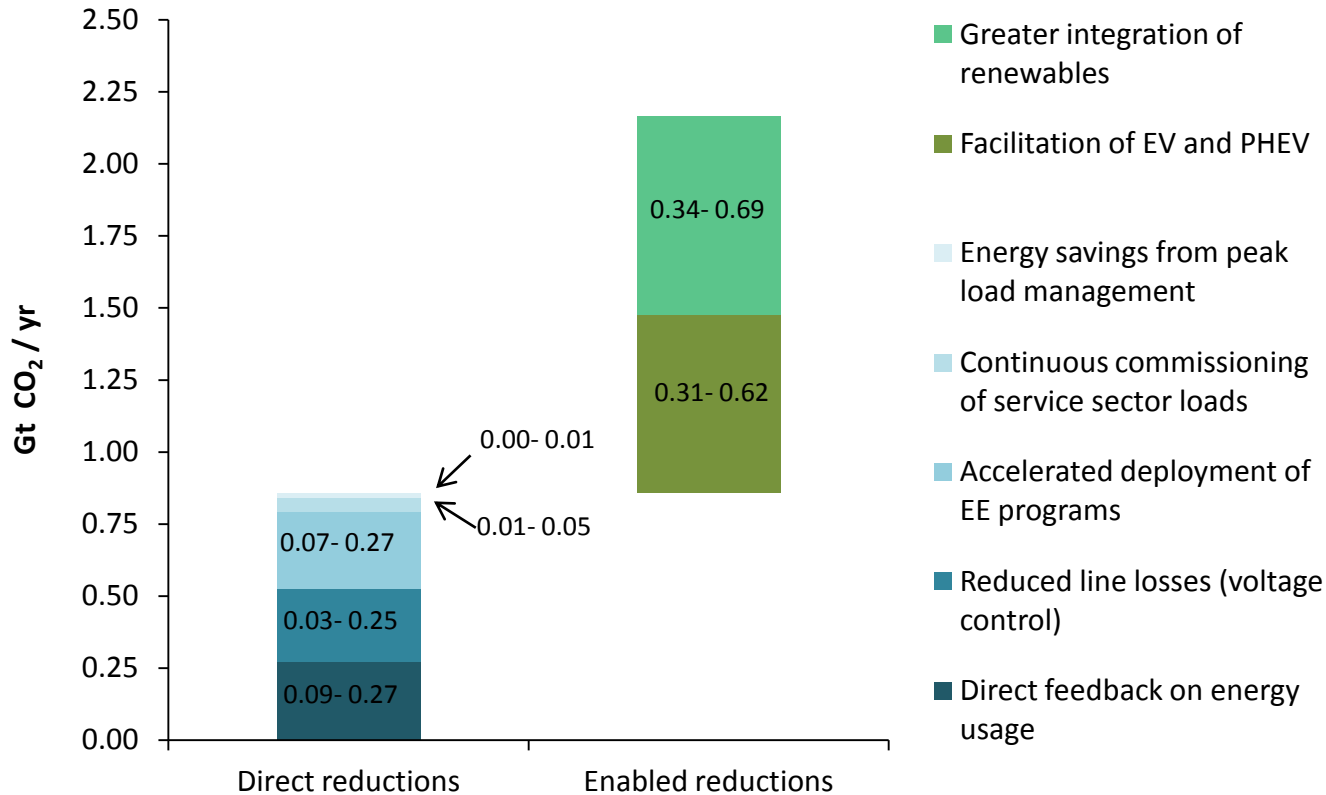
	Direct Use in Plant	T&D Losses	Pumped Storage	Total
OECD North America	4%	7%	1%	12%
OECD Europe	5%	7%	1%	13%
OECD Pacific	4%	5%	1%	10%
Economies in transition	7%	12%	0%	20%
China	8%	7%	0%	15%
India	7%	26%	0%	33%
Other Asia	4%	9%	0%	13%
Latin America	3%	17%	0%	20%
Africa	5%	11%	1%	17%
Middle East	5%	13%	0%	18%
World	5%	9%	1%	15%



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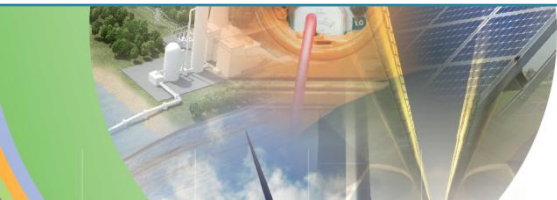
# 2050 Blue Map CO<sub>2</sub> emission reductions from Smart Grids



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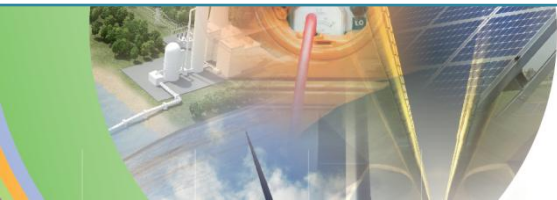
# Why do we need Smart Grids?

- Demand is growing
- Demand is changing
- Losses can be reduced
- Generation is changing
- CO<sub>2</sub> emissions can be reduced
- Investment is needed in the electricity system
  - USD 8.4 – 12.3 trillion by 2050 in T&D



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# SMART GRID ROADMAP

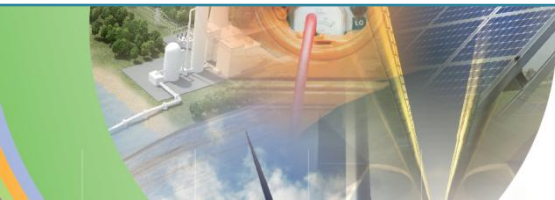


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# Why Clean Technology Roadmaps

- Development of new, clean technologies is essential for climate change mitigation
- Market mechanisms – e.g., carbon pricing – are insufficient to deliver needed technology advancements in time
- Energy technology policies are needed to:
  - Address technology-specific barriers
  - Accelerate early deployment to create economies of scale
  - Support technology diffusion and knowledge sharing
- Roadmaps provide a structured way to identify technology policy needs



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# Smart Grid Roadmap Process

## Scope:

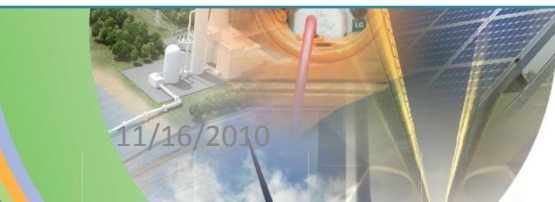
*Demonstrate solutions for future energy needs via development and deployment of smart grid technologies in generation, transmission and distribution, as well as in end-use sectors.*

## Workshops:

- Participation in IA Workshops (Policy workshop April 2010, Finance Sept 2010)
- Smart Grid technology RD&D needs (May 2010)
- Roles of Government and Private Sector in Smart Grid RD&D (June 2010)
- Smart Grids – Smart Customer Policy (Sept 2010)
- **Developing Country and Emerging Economy Smart Grid Perspectives (November 8-9, 2010 – Korea)**

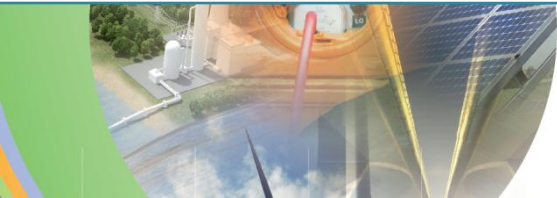
## Targeted Analysis:

- Estimated cost of the Smart Grid
- CO<sub>2</sub> Emission reductions due to Smart Grid deployment



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# PREVIEW OF SMART GRID ROADMAP KEY MESSAGES

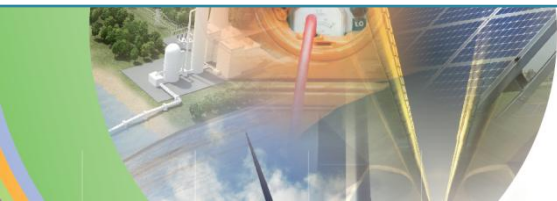


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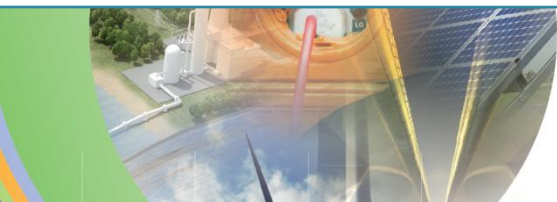
# Key Messages Preview Part 1

- Deployment will include new technology and new build but integration of existing electricity infrastructure is very important
- The “Smartening” of grids is already happening – it is not a one time event
- Different parts of the grid already have certain amounts of intelligence – especially transmission
- Collaboration between government and the private sector is essential – a significant part of the roadmap process



# Key Messages Preview Part 2

- All stakeholders need to understand the needs and benefits of smart grids – especially the customer
- Business models and regulation will need to evolve – don't try to find the end state in one step.
- Utilities will need to move from “command and control” to being a knowledge broker.
- Analogies are useful (internet, mobile phones) – but the electricity system has unique qualities

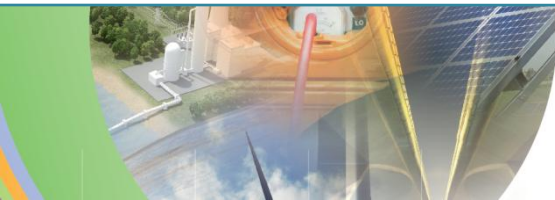




# Consolidating the vision and process

OECD countries have similarities and differences with developing countries and emerging economies - but the process can remain the same:

- Plan for the future
  - Where are you going – what are your high level drivers
- Understand your region
  - What are your short/medium/long term needs
  - What are your resources
  - What is the status of your system
  - What is your regulatory structure
- Evolve your system – this is not a one time event
- Explain what and why!



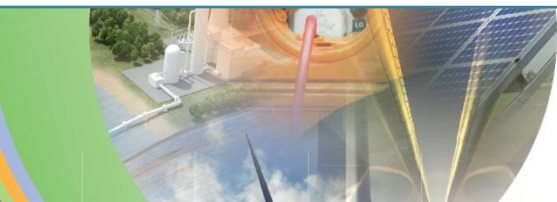
# For more information

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[www.iea.org/techno/etp/index.asp](http://www.iea.org/techno/etp/index.asp)

[www.iea.org/roadmaps](http://www.iea.org/roadmaps)

[david.elzinga@iea.org](mailto:david.elzinga@iea.org)



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