

**California Alliance for Distributed Energy Resources (CADER)
California Solar Energy Industries Association (Cal SEIA)**

Breakout D - DER Emerging Technologies

September 8, 2005

2:00 - 3:15 pm

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Public Interest Energy Research (PIER) Program
Energy Generation Research Office
California Energy Commission**

Distributed Energy Resources



- DER (renewables, advanced fossil fuel DG, and CHP technologies) are components of energy independence for California
- DER will help to achieve California's goal of ensuring adequate, reliable and affordable energy supplies to improve California's economic and environmental condition.
- Federal and CA legislation to promote DER: e.g., renewable portfolio standard, incentives such as self-generation incentives, and tax credits.
- CEC and CPUC recognize the importance of DER in policy documents: Energy Action Plan and Integrated Energy Policy Report
- Grid Connected DG
 - USA > 17,500 MW
 - California ~ 3,500 MW
- Emergency or other non-interconnected DG
 - USA ~130,000 MW
 - California ~ 26,500 MW

DER is growing, but issues need to be resolved and barriers lowered

PIER DER Technology Areas



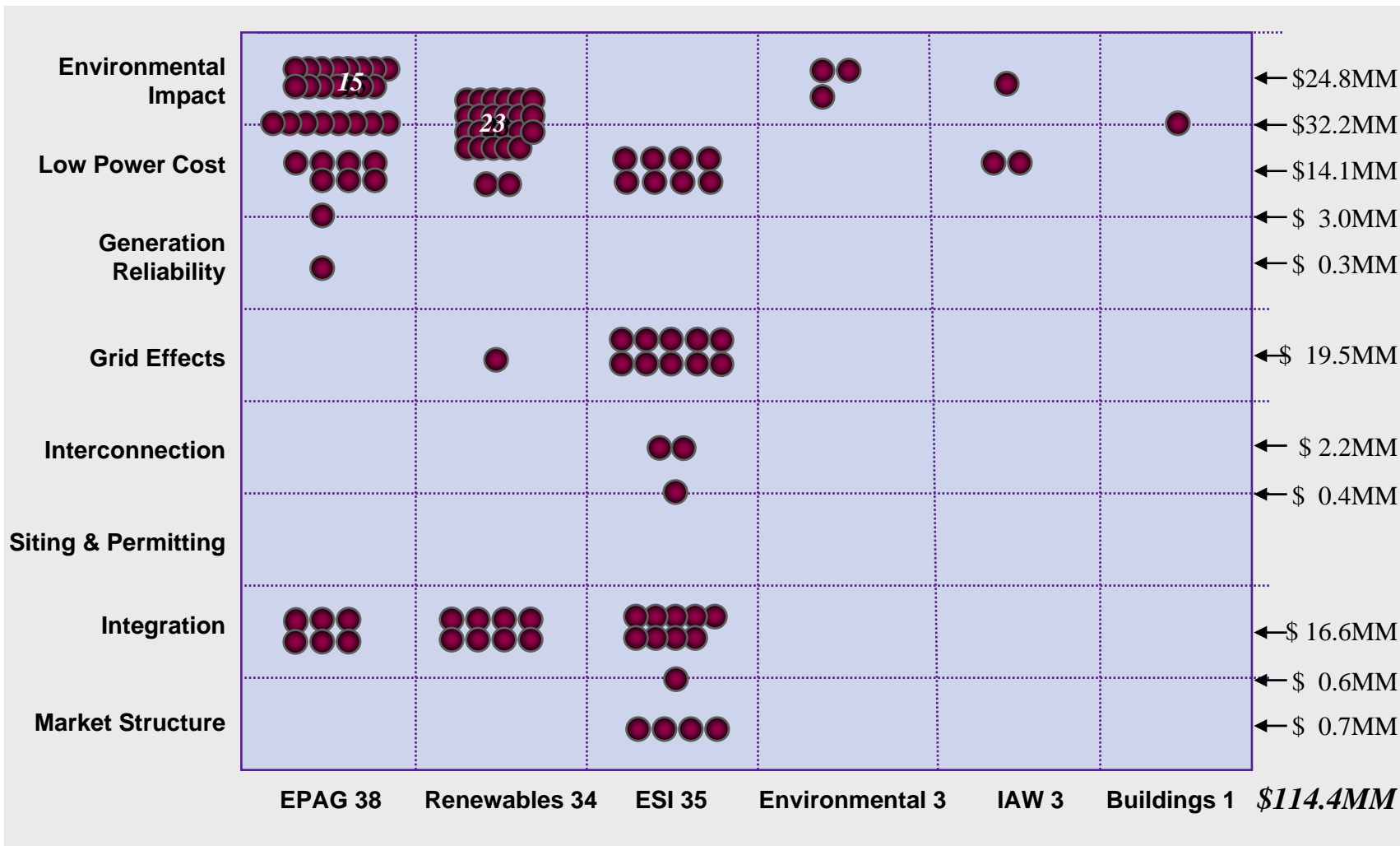
All six PIER program areas have projects that are DER related

- **Environmentally Preferred Advanced Generation (EPAG)**
IC engines, gas turbines, fuel cells, CCHP
- **Renewable Generation**
Wind, photovoltaic, biomass, small hydro, geothermal
- **Energy Systems Integration (ESI)**
Interconnection, market integration, market structure
- **Energy-Related Environmental (PIEREA)**
Environmental impact analyses
- **Residential & Industrial Buildings End-Use Efficiency**
CCHP
- **Industrial, Agriculture and Water (IAW) Efficiency**
CCHP, process heat

Total DER Investments by PIER (1998 – 2004)



PIER has invested ~ \$114 million in 114 DER research projects to address multiple policy and technology research issues

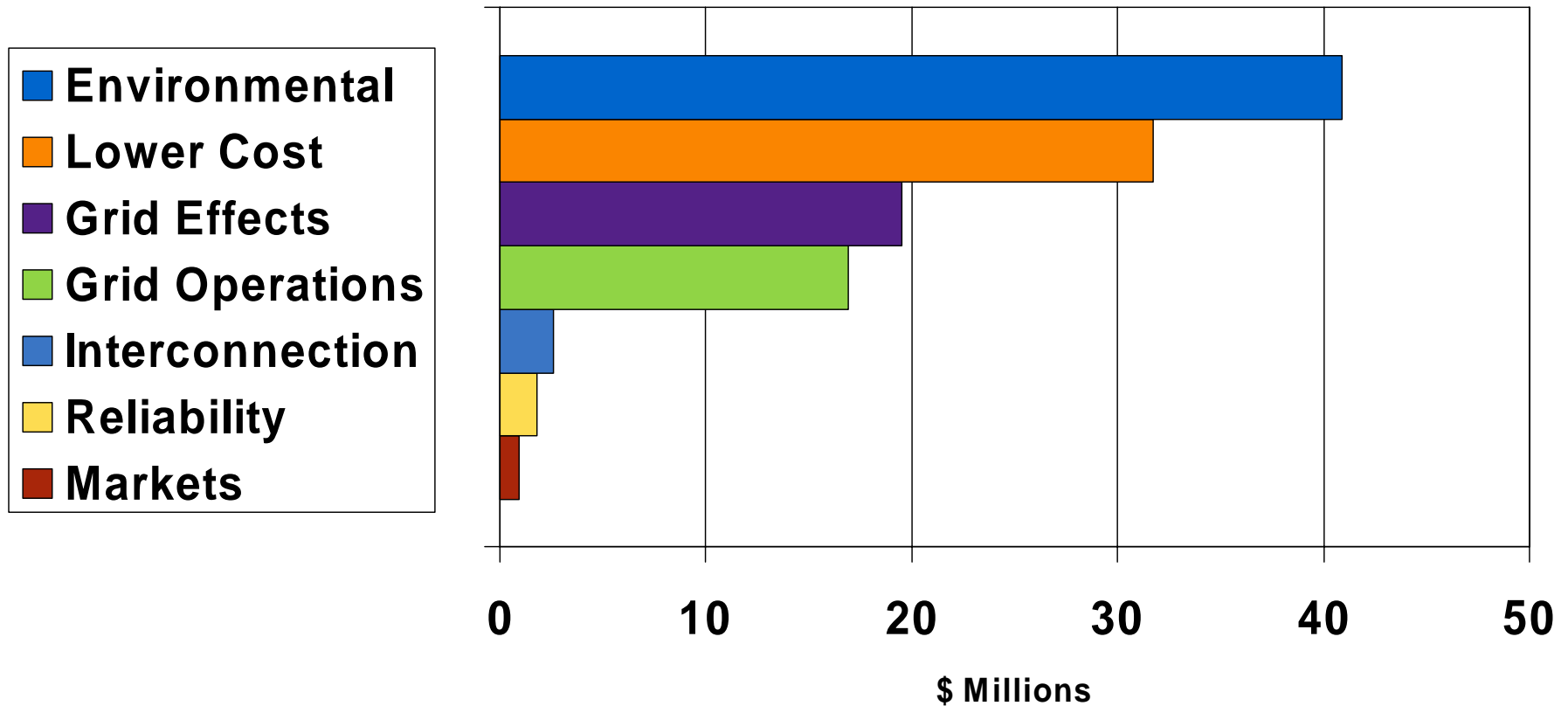


Note: Updated as of 11/24/04

PIER DG Topic Areas



114 projects are DG related and total \$114 million out of over \$336 million in total PIER-funded R&D, 1998-2004



*64% of portfolio is focused on making DG cheaper and cleaner
35% is looking at integration issues*

What has changed since CADER 2004?



- Natural gas and oil prices still rising
- New summer peak for California natural gas usage
- Proposed 2007 CARB emissions standards and Self Generation Incentive Program – limit DG to technologies that are low emissions, high efficiency, and/or renewable
 - In 2005 and 2006: NOx emissions of 0.14 lb/MWh, OR use waste heat to meet a 60% efficiency standard, then adjust the NOx emissions level.
 - In 2007: First meet 60% system efficiency standard, with or without credit for waste heat utilization (AB 1685). Then meet NOx limit of 0.07 lb/MWh, with or without the waste heat utilization credit.
- Federal Energy Policy Act of 2005
 - New Business Tax Credits effective 1/1/06 to 12/31/07
 - Fuel cells with $\geq 30\%$ efficiency, up to \$1,000/kW
 - Microturbine generators with $\geq 10\%$ efficiency, up to \$200/kW
 - Two-year extension of PTC for DER using biomass, landfill and waste gases
 - DOE/FERC study of distributed generation (Section 322)
 - States must adopt interconnection standards within 2 years
 - \$768 million in 2007 to 2009 for Distributed Energy and Electric Energy Systems Activities (including \$20 million/year for “Micro-Cogeneration Energy Technology” research in 2007 and 2008)
 - \$3.3 billion over 5 years for hydrogen and fuel cells