

## ***Israel Renewable and Alternative Energy Developments***

**Presented by Dr. Amit Mor**

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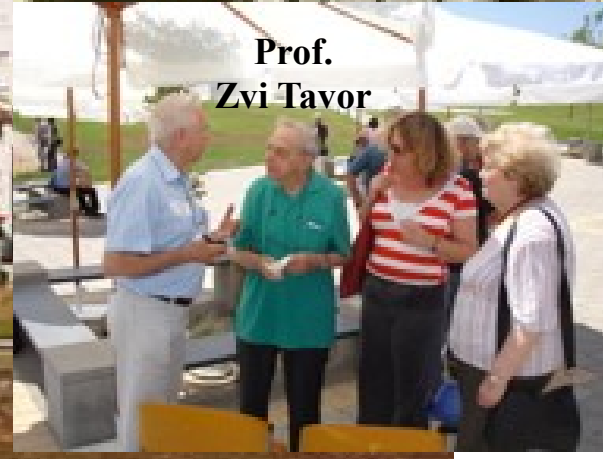
Zenith Solar concentrating photovoltaic technology

# Solar thermal water heating

95% utilization in house holds,  
Mandatory in Israel since 1980



David Ben Gurion



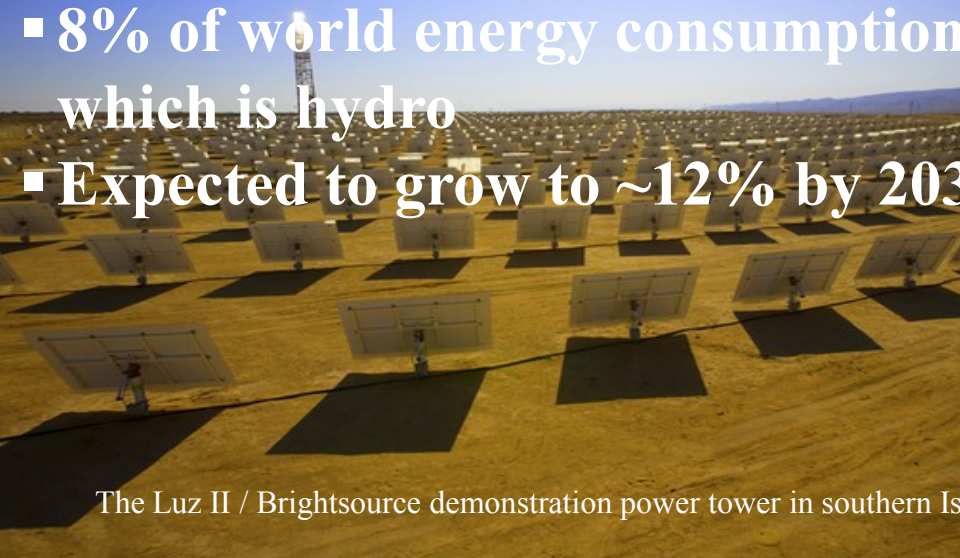
Prof.  
Zvi Tavor





# Renewable Energy

- 8% of world energy consumption (90% of which is hydro)
- Expected to grow to ~12% by 2035



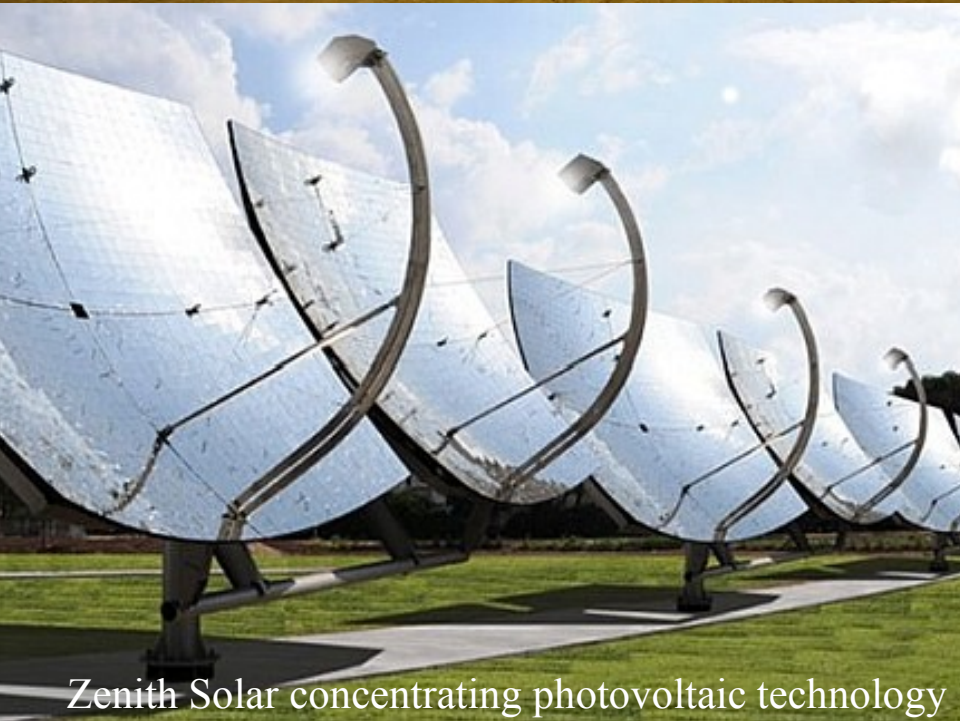
The Luz II / Brightsource demonstration power tower in southern Israel



Luz and its successor Soler  
Solar thermal power plants



**In the 1980s Israel's Luz commissioned a 352 MW thermal solar plant in the Mojave desert, CA**



Zenith Solar concentrating photovoltaic technology



Aora solar thermal tower





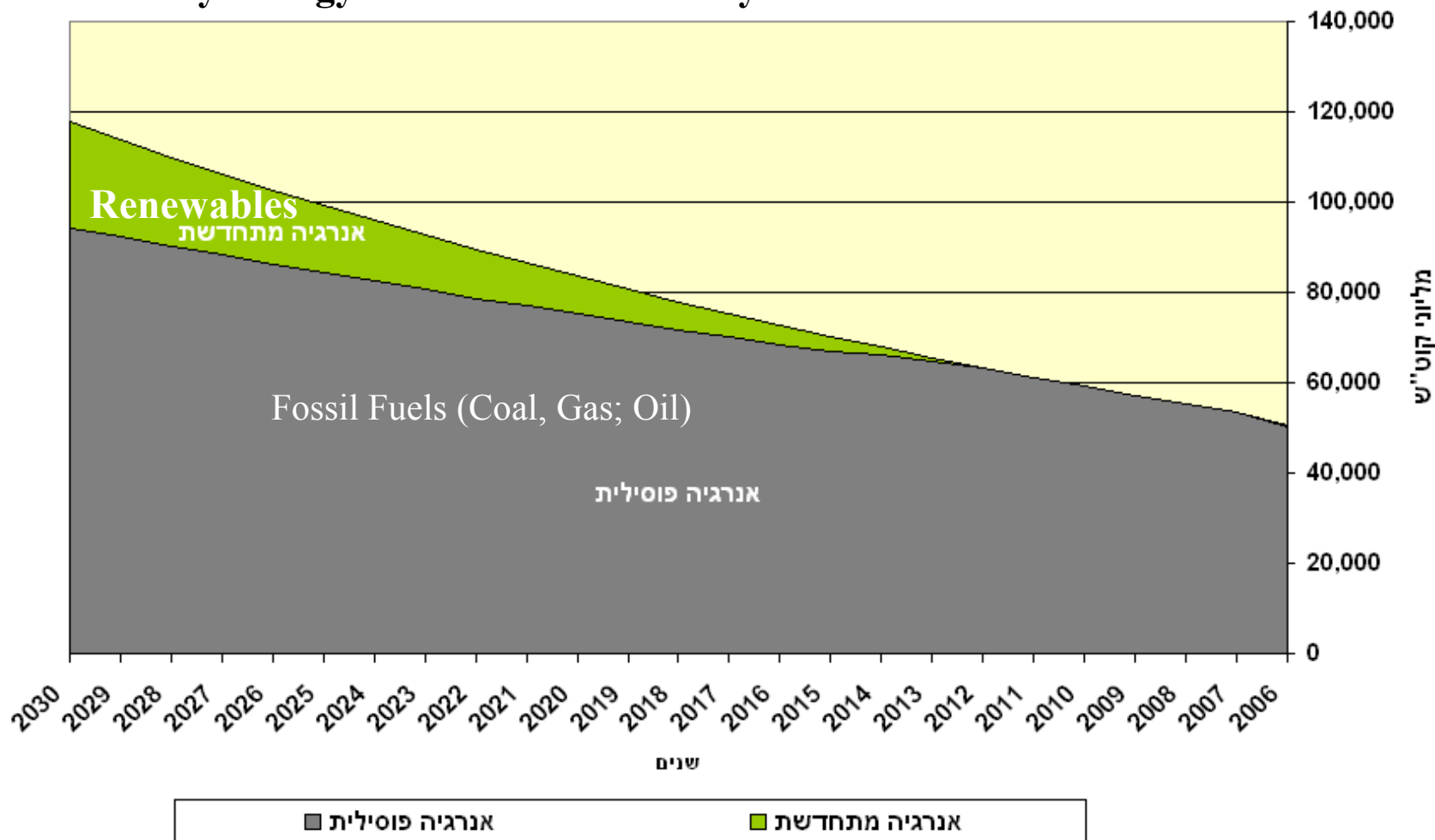
Arava Power 5 MW PV plant in Ketura  
First solar plant in Israel, June 2011

**Feed in Tariff**  
**2008 – 40 Eurocents / KWh**  
**2013 – 9 Eurocents / KWh**

**300 MW PV Installed**

תחזית מקורות אנרגיה ליצור חשמל בישראל, 2008 - 2030

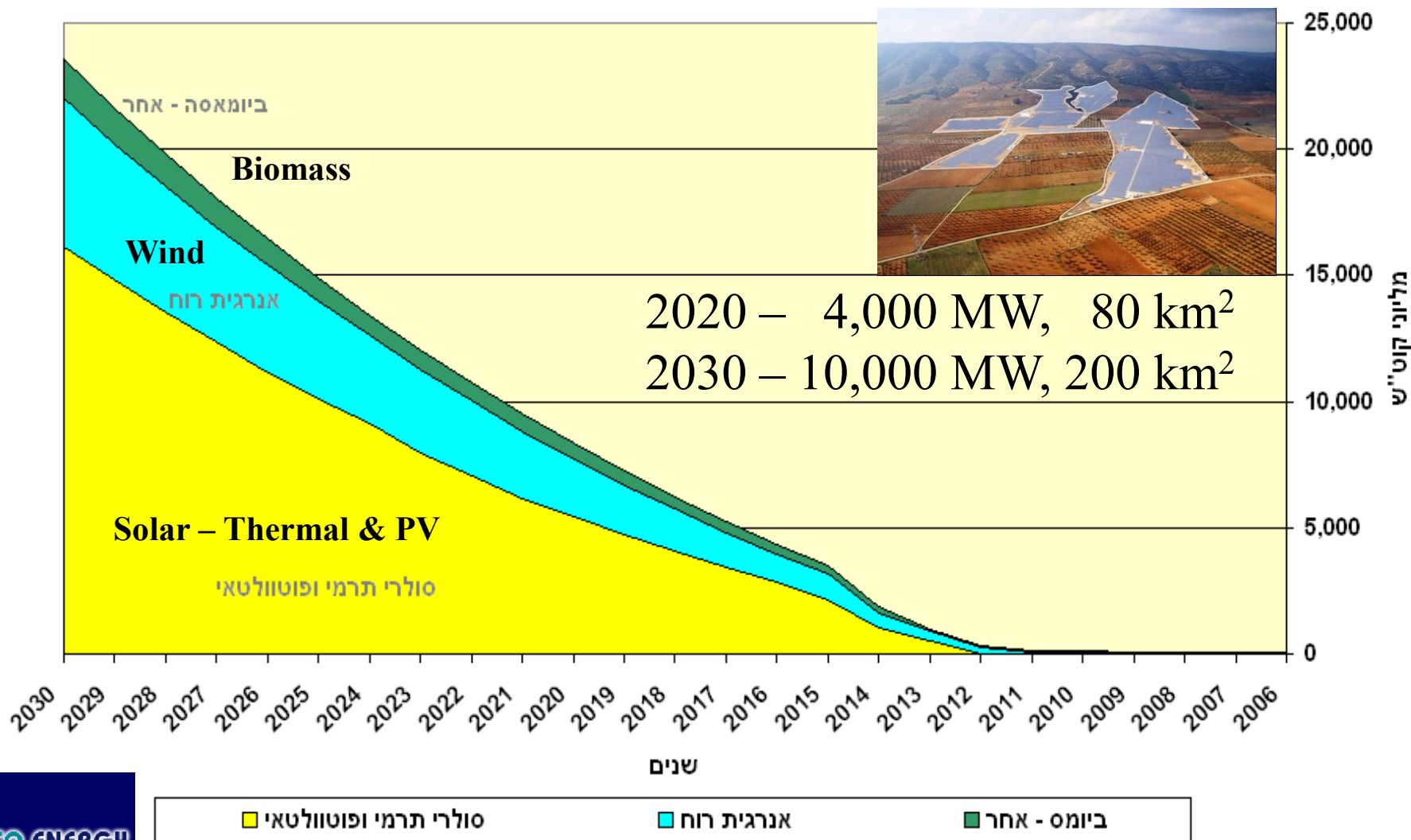
## Primary Energy Sources for Electricity Production in Israel: 2008-2030





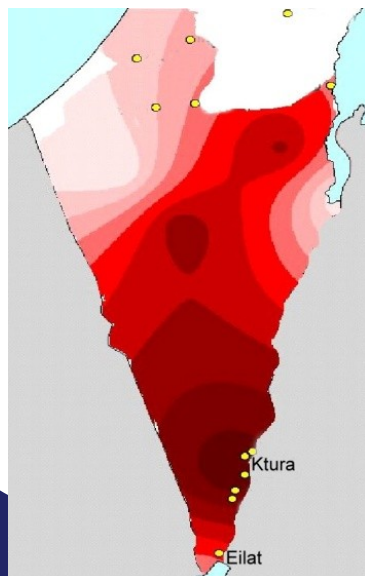
# Israel: Renewable Energy Penetration Forecast 2009-2030

Million KWh (Implications of GOI objectives)




# Net benefits of large scale utilization of Renewable energy in Israel

**US\$ 3 Billion**



		Appendix reference	NPV 7%	Annually Levelised
<b>Benefits</b>				
<b>Direct benefits</b>				
Avoided environmental costs	\$10/ton CO <sub>2</sub>	A1	428.7	40.2
	\$20/ton CO <sub>2</sub>		709.6	66.9
Stable and known energy prices		A2	70.7	6.7
Avoided transmission & distribution (T&D) costs		A3	116.1	11.0
Avoided fuel costs		A4	171.5	16.2
Real options value for T&D investments		A5	2.3	0.2
<b>Total direct benefits</b>	\$10/ton CO <sub>2</sub>		<b>786.0</b>	<b>74.2</b>
	\$20/ton CO <sub>2</sub>		<b>1,071.8</b>	<b>101.2</b>
<b>Indirect benefits</b>				
Income multiplier: Thermal technologies		A6	1,179.5	94.6
Income multiplier: PV technologies		A7	551.0	44.2
Avoided unemployment compensation: Thermal technologies		A6	234.2	18.8
Avoided unemployment compensation: PV technologies		A7	134.5	10.8
<b>Total indirect benefits</b>			<b>2,099.2</b>	<b>168.4</b>
<b>Total benefits</b>		\$10/ton CO <sub>2</sub>	<b>2,885.2</b>	<b>242.6</b>
		\$20/ton CO <sub>2</sub>	<b>3,171.0</b>	<b>269.6</b>
<b>Costs</b>				
Additional generation costs		A8	962.1	77.2
Environmental costs		A9	25.3	2.0
Fuel switch to solar heating/cooling		A10	126.6	10.2
<b>Total costs</b>			<b>1,114.0</b>	<b>89.4</b>
<b>Total net benefits – 7% discount rate</b>	\$10/ton CO <sub>2</sub>		<b>1,771.2</b>	<b>153.2</b>
	\$20/ton CO <sub>2</sub>		<b>2,057.0</b>	<b>180.2</b>
<b>Total net benefits – 5% discount rate</b>	\$10/ton CO <sub>2</sub>		<b>2,713.0</b>	<b>205.7</b>
	\$20/ton CO <sub>2</sub>		<b>3,184.3</b>	<b>243.5</b>



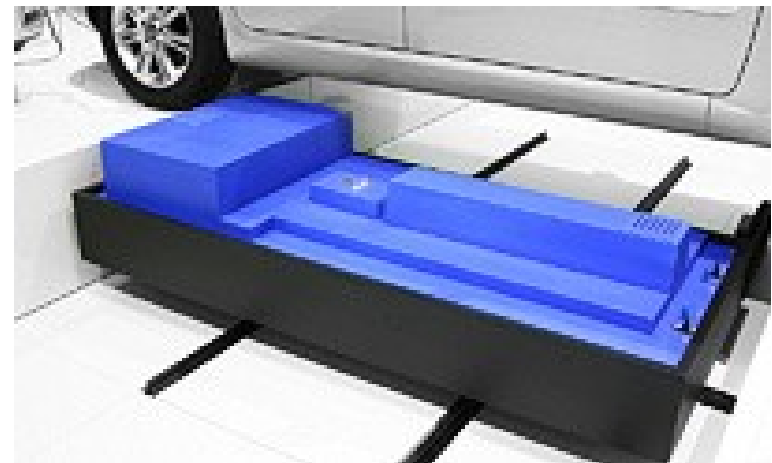
Our long term vision is natural gas, renewable and nuclear energy for power generation to fuel the world's Auto fleet — run on gas, charge batteries and produce hydrogen for transportation

## *The Clean Transportation Vision*

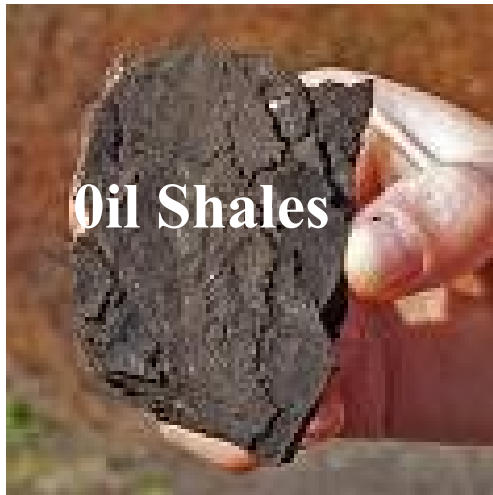




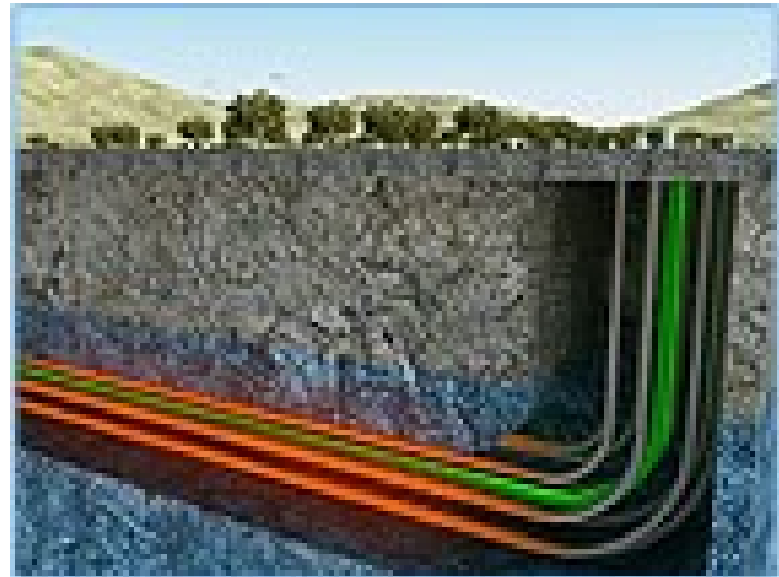
# Plug-in electric cars Will be introduced in 2012



# IEI Oil Shale in-situ technology

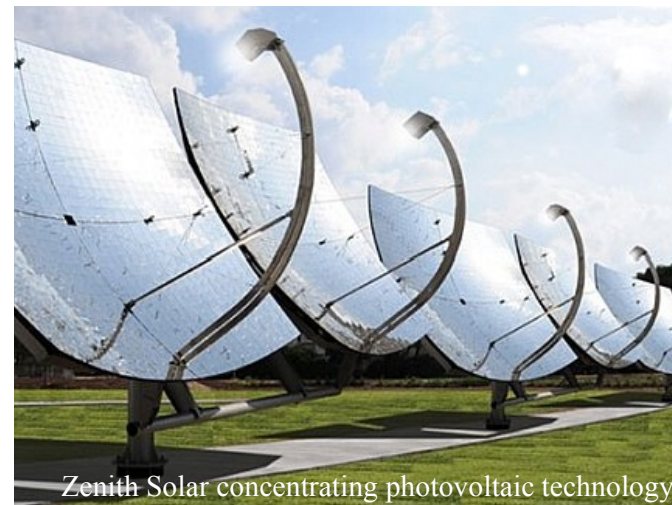


- Reserves of 400 billion tons of oil shales
- Containing ~250 billion Barrels of oil
- Technology is being developed by IEI





# Natural gas & renewable energy to enhance energy and environmental security



## Thank You