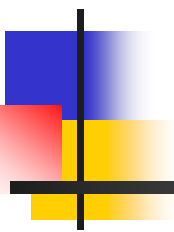


# **The Status Quo, Barriers, and Countermeasures to Small Hydropower Development in Rural China**



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  - Internal problems of small hydropower
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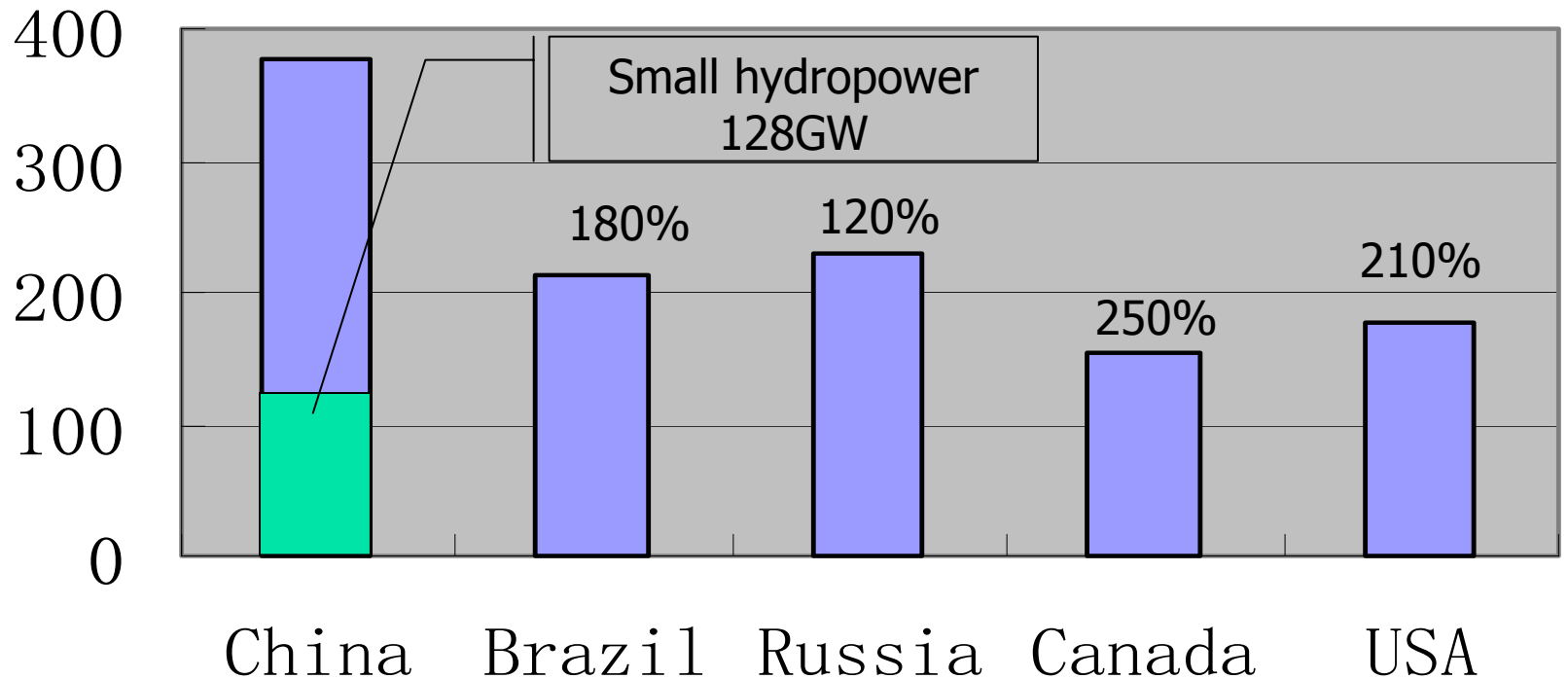


# I. The Small Hydropower Resources of China

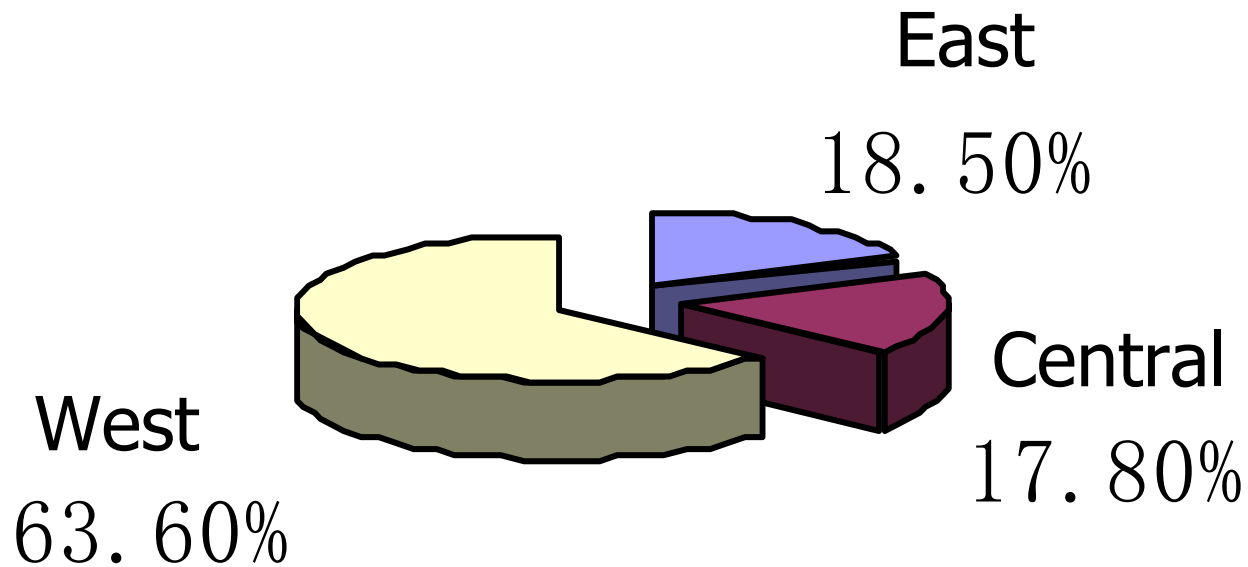
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- Theoretical potential: 676GW, annual electricity generating capacity: 5920TW.h.
- Technologically exploitable: 378GW, 13.22% of the world total, annual: 1920TW.h.
- Of which: **small hydropower 128GW**, annual: **640TW.h**. Share in China's hydropower production: **29.7%**, ranking **No. 1** in the world.

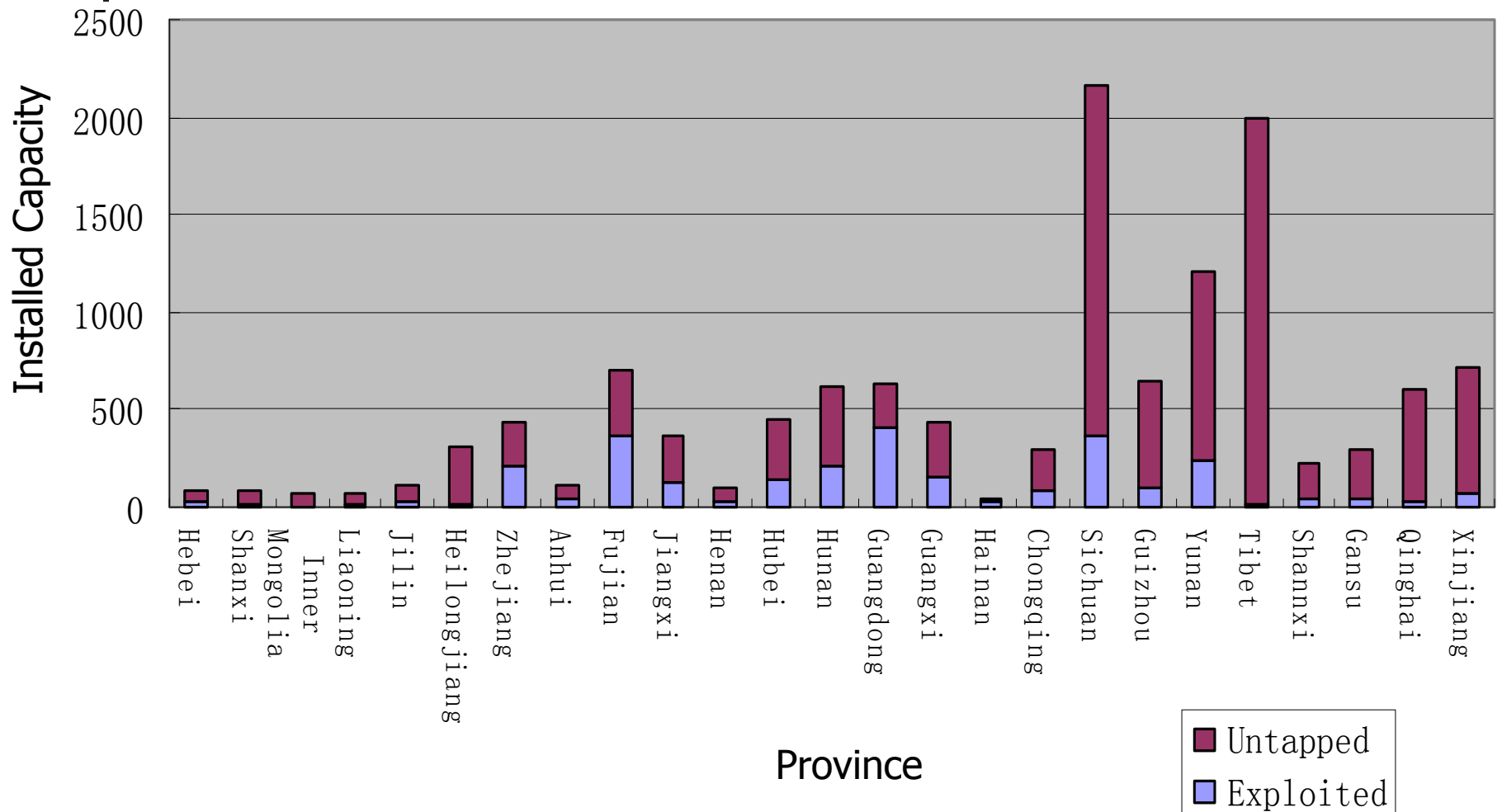
# Hydropower Resources of Selected Countries



# The Distribution of Small Hydro-power among Different Regions



# The Untapped Shares in Different Provinces



## II. China's Small Hydropower Development Achievements

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- Development speed: 5%~10%
- By the end of 2003: there have been **48000** small hydropower stations in over **1600** counties, **31.2GW** , **110TW.h**, both accounting for **40%** of the national total



## Achievements (Contd.)

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- More than 800 county grids and over 40 regional grids have been built, more than **800 counties** mainly rely on small hydropower for electricity supply
- Accumulatively, giving electricity supply access to more than **500 million people**



# Achievements (Contd.)

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- In through 3 phases, 653 rural counties realize preliminary electrification
- Cultivated thousands of small hydropower experts for 60 countries and regions, participated in the construction of hundreds of small hydropower projects in more than 50 countries
- Ecological and environment protection, 100 mt t CO<sub>2</sub> of GHG emission reduction



# III. Barrier to Small Hydro-power Development in China

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- **1. Inherent problems of small hydropower**
  - Small electricity production scale
  - Instable supply: high water seasons and low water seasons, peak and bottom hours
  - Low technology level and efficiency of the generating units
  - Improper operation modes
  - Operation suspension during overhaul and accidents



# Barriers (Contd.)

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- **2. Institutional, market, and policy barriers**
  - The resource administration system is imperfect, vagueness in responsibility and function division
  - Electricity sales difficulty— market monopoly
  - Commonwealth nature restriction— policy-based supply is insufficient, without the necessary compensation

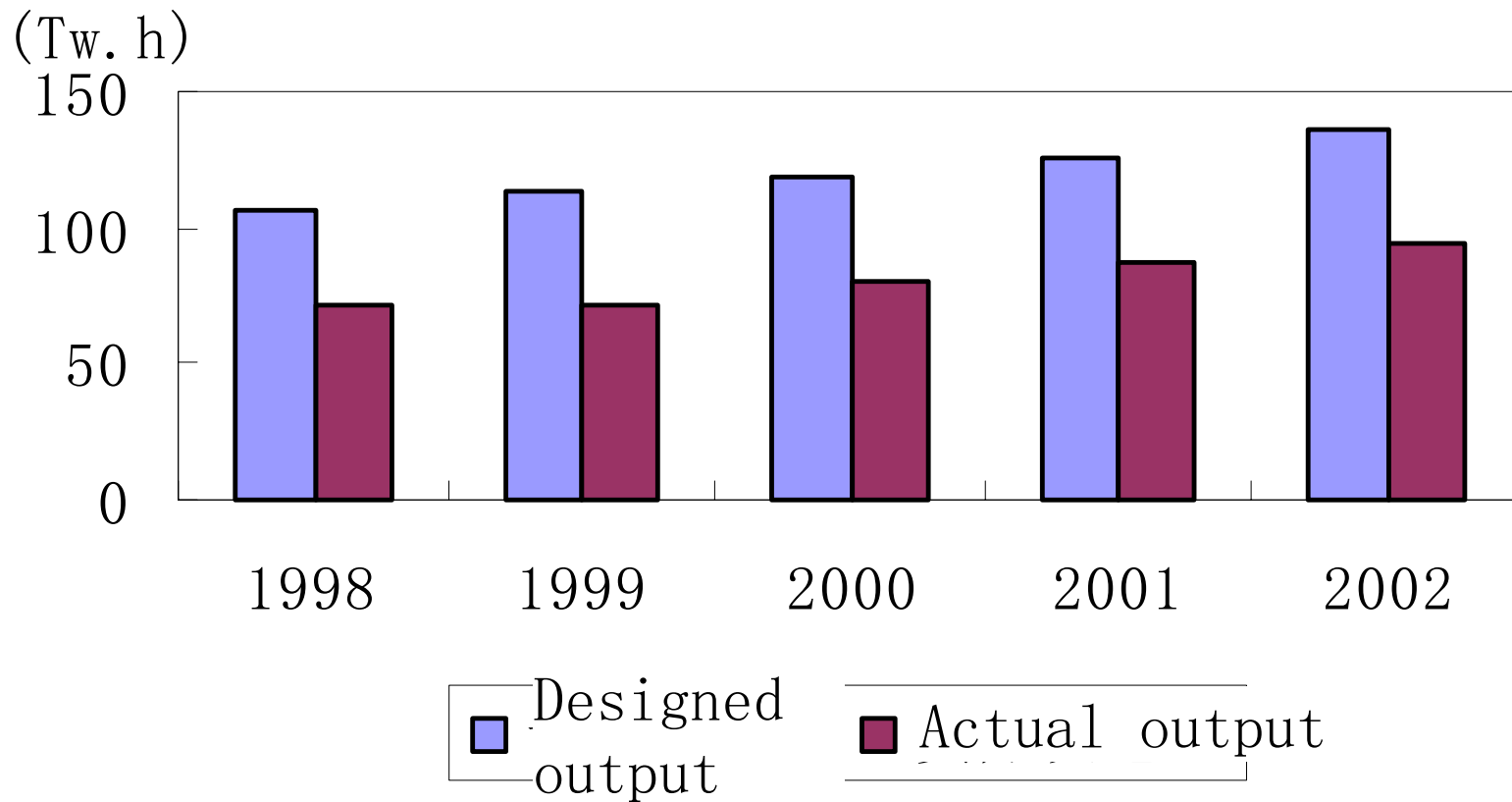


# Impacts of the Barriers (economic analysis)

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- Capacity deducted 30%, in some cases even as high as over 50% (Fig.)
- The electricity production deduction in 2002 was 41TW.h, in terms of revenue loss, over RMB 10 billion

# A comparison of the theoretical and actual electricity Output





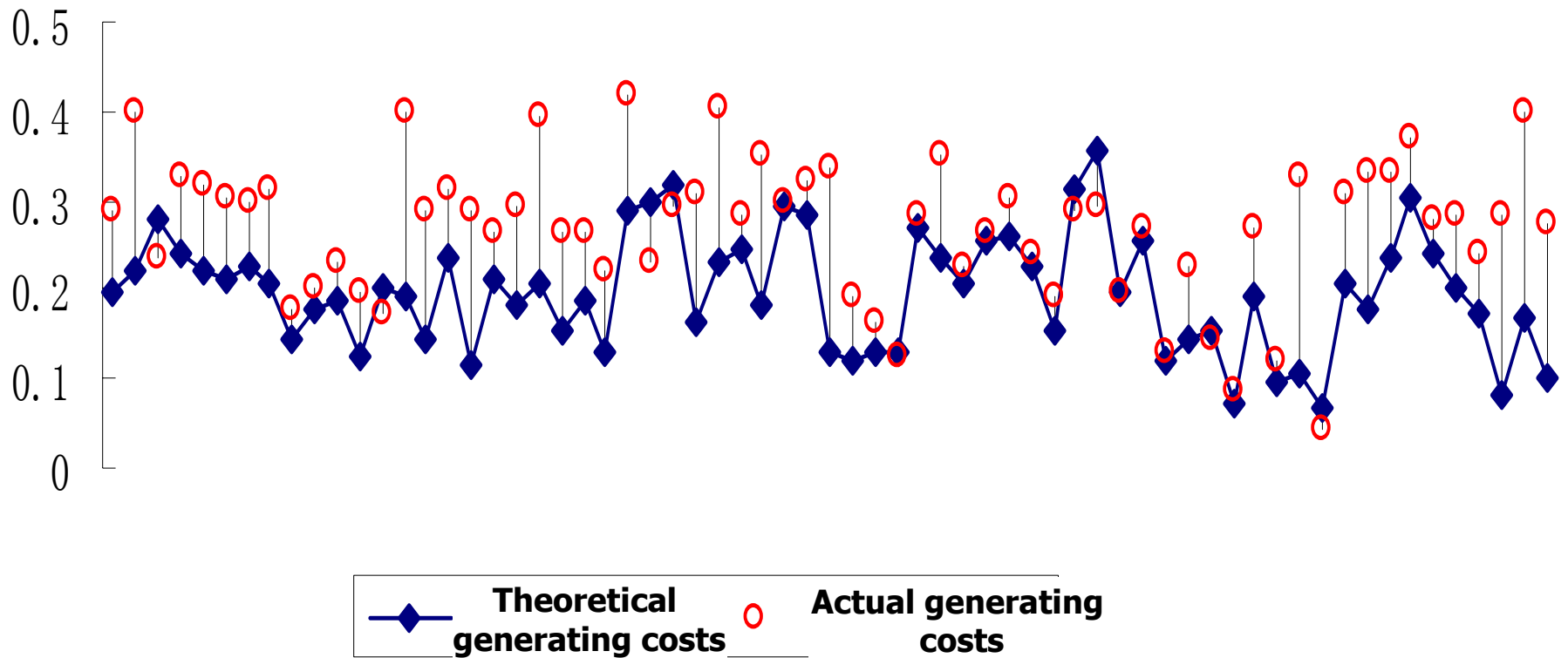
# economic analysis

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- Capacity deduction → higher unit generating capacity construction cost and unit electricity generating cost → losses (Fig.)
- In 2002, actual average generating cost is 0.06 RMB/kW.h higher than the average designed generating cost

# Theoretical and Actual Production Costs of the 64Hydropower stations

(RMB/kw. h)



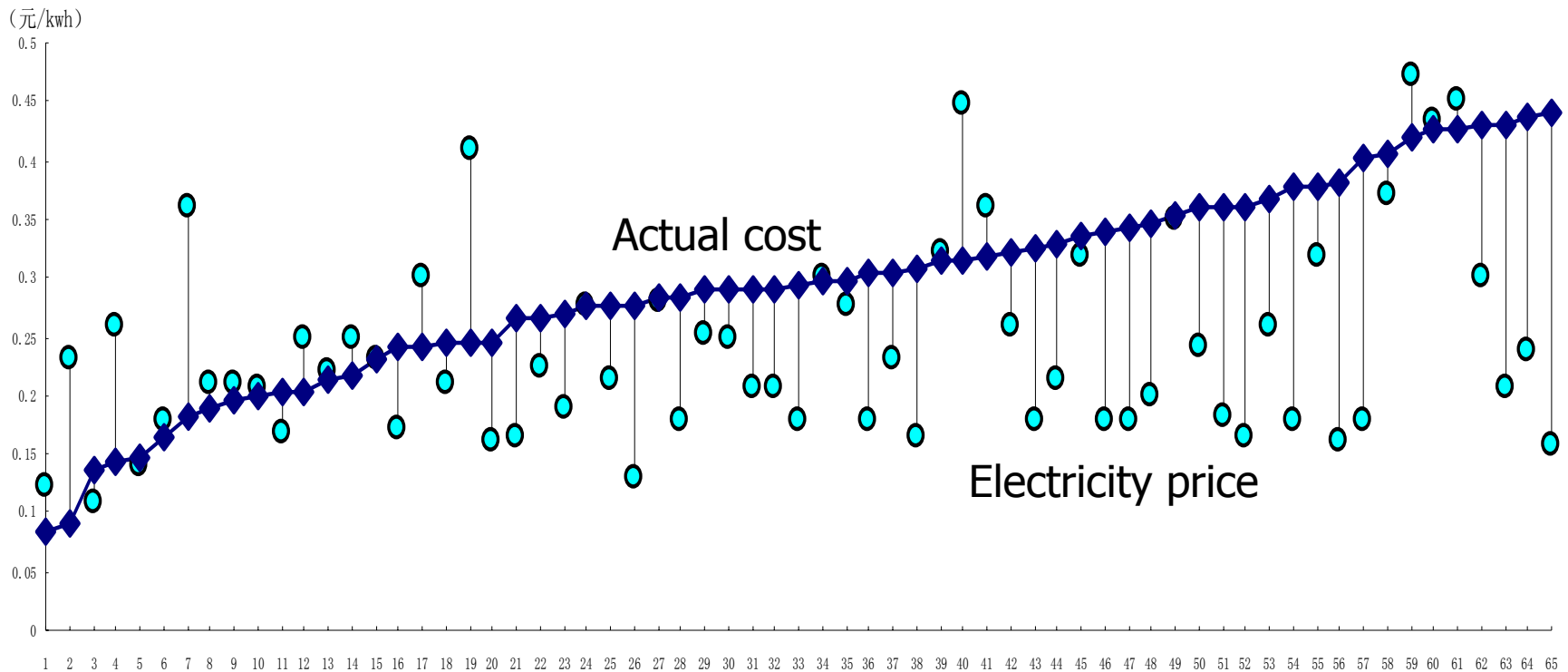


# economic analysis

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- Among the 64 small hydropower stations studied: 11 realize some profits; 13 break even; 40 are in the red; namely, 62% of them report losses.
- The average actual electricity generating cost is 0.05RMB/kW.h higher than the average electricity price (Fig.)

# The actual costs and sales price of the 64 small hydropower stations

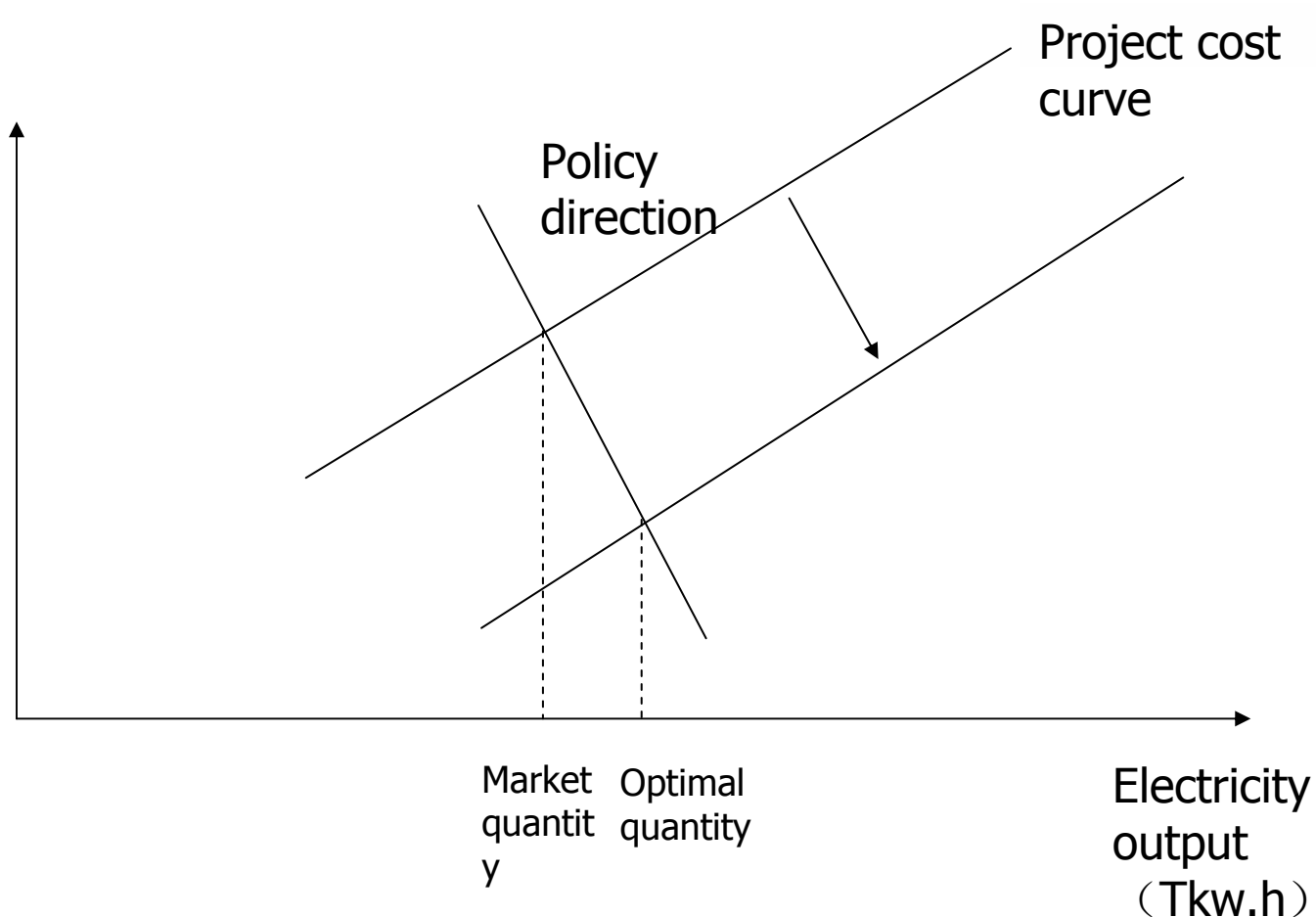
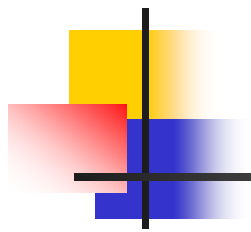




## IV. Policy Recommendations

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- Policy Direction: internalize the positive externality costs of rural hydropower through such macroeconomic measures as administrative laws and regulations, preferential electricity price, tax, subsidy so as to bridge the gap between production costs and social costs (Fig.)





# Recommendations (Contd.)

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- Eliminate institutional and market barriers
  - Specify and quantify the market share of small hydropower
  - Giving priority in grid access and require the grids to purchase all the electricity output of small hydropower plants
- Acknowledge its commonweal nature



# Recommendations (Contd.)

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- Optimize the electricity pricing mechanism
  - Offer market price protection to the grid entry of rural hydropower ; protect them from direct competition with regular energy sources.
  - On the above basis, establish a grid entry and price control system to stimulate the development of rural hydropower



# Recommendations (Contd.)

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- Strengthen capacity building on small hydropower enterprises
  - Improve adjustability
  - Optimize operating modes
  - Adopt advanced technologies
  - Intensify management, lay off redundant workers, and increase efficiency

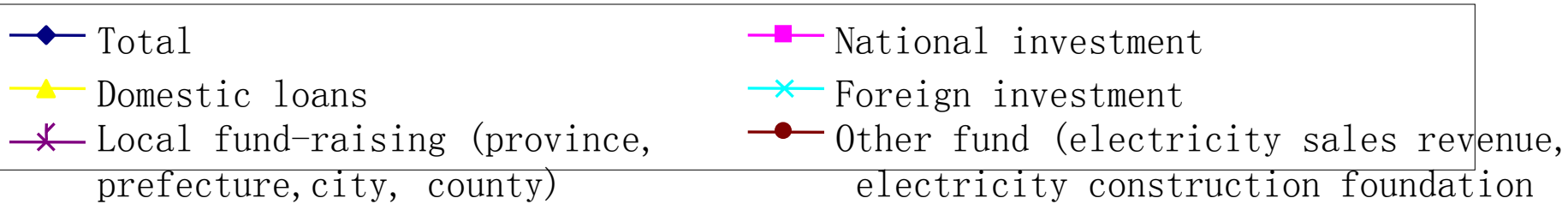
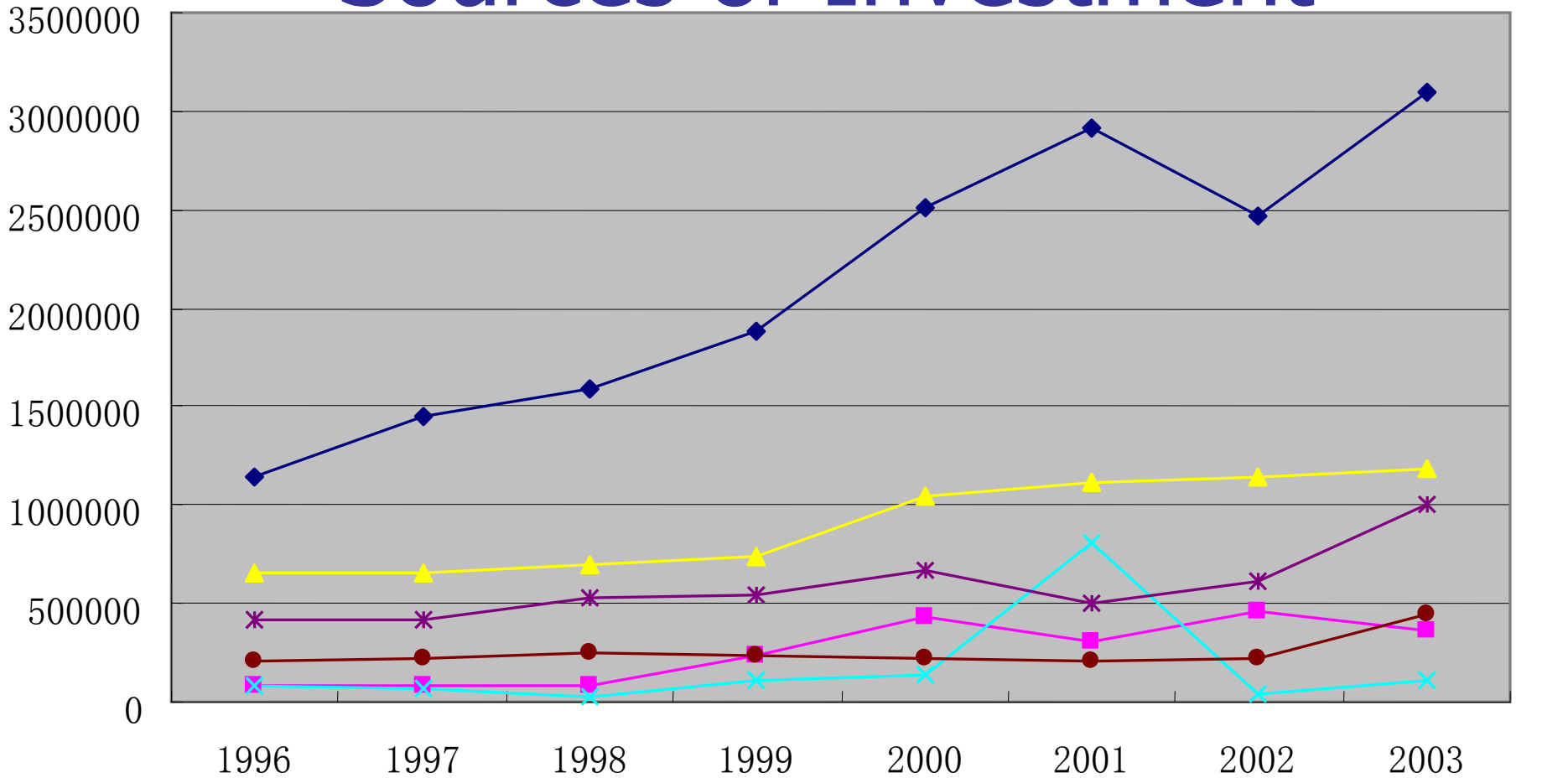
# V. Development Prospects of the Chinese Small Hydropower Industry

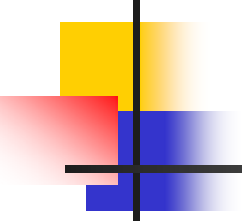


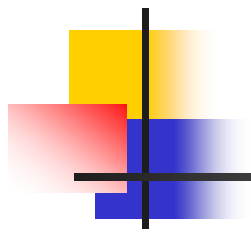
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- Market demand
  - Sustained rural economic growth, urbanization, increases in farmer income, huge potential market. 400kW.h
- Market supply
  - Abundant resources, low exploitation rate. 128GW-31.2GW=96.8GW,
  - The Renewable Energy Promotion Law– expected. Enormous financing potential: fiscal support, credit, private enterprises, foreign investment (Fig.)

# Sources of Investment



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- Therefore, in terms of demand and supply potential, small hydropower projects have very promising market prospects in China.



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**~End~**

**Thanks, Comments  
Welcomed!**