Identification of potential and barriers for developing District Cooling in Lima, Peru – A case

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Is the provision of district cooling for public and commercial buildings in Lima’s financial district a viable alternative?
Contents

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Background

- Location: San Isidro district, Lima, Perú
- Main commercial and special regulatory zones in the metro area

General Issues warm urban areas:
- High demand for space cooling
- Urban heat island effect
- Susceptibility to climate change
- Refrigerant leaks in conventional AC
Methods

- Data Collection
  - Interviews
  - Literature
  - Databases
- Estimation of Cooling Demand
  - Cooling Degree-Days (CDD)
  - Energy Mapping
- System Sizing and Costs
Scope, Limitations and Considerations

- Exploratory study
- Limited to commercial and public buildings in San Isidro district
- Limited number of technologies considered
- No growth in existing building stock or cooling demand.
- Limited number of local stakeholders and related actors engaged.
- Final business model not assessed in detail.
Institutional Framework

Environmental Policy
Energy Efficiency Policy
Construction Policy
Municipal Regulation

Government and private sector initiatives

District Cooling
Institutional Barriers

- Conflicting attitudes and priorities within and between institutions
- Limited intervention outside of the public sector and by local governments.
- Economic cost-benefit is often the only decision driver
- Municipal zoning does not consider district energy
- No local DC expertise
- Citizens and end-consumers not in the loop
  - Generally apprehensive of public enterprises
Opportunities

- New trend towards sustainability, including energy efficiency
  - Favorable policy initiatives mandatory to public sector entities
  - Competitive edge for private sector real-state developers
- High CDD value: cooling demand year round
- High cooling demand density in the district
Opportunities – Cost Benefit

<table>
<thead>
<tr>
<th></th>
<th>BAU</th>
<th>DC Purchase</th>
<th>Avoided Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site A</td>
<td>38.8 mil. US$</td>
<td>52.2 mil. US$</td>
<td>-12.4 mil. US$</td>
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<tr>
<td>Site B</td>
<td>13.2 mil. US$</td>
<td>11.6 mil. US$</td>
<td>1.6 mil. US$</td>
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</tbody>
</table>
Opportunities – Consumer Cost Benefit

Impact on Net Present Cost by Change in Assumptions

-2,000,000 -1,500,000 -1,000,000 -500,000 $- $500,000 $1,000,000 $1,500,000 $2,000,000

Chiller Plant, +/-10%
Discount Rate, +/-2%
Cold Storage, +/-10%
Energy Price, +/-10%
Dist. Network, +/-10%
Contingency, +/-5%
O&M, +/-10%
Salvage Value, +/-2.5%

High  Low
Conclusions

- Sometimes... economically viable
- Institutional and practical barriers present.
- Promotion, local expertise and changes in institutional governance needed.
- Climate change, energy efficiency and sustainable construction policy may serve as platforms for a district cooling developments.
- Energy mapping, and economic cost-benefit analysis serve as tools for identifying and promoting new district cooling potentials.
Further Work

- More detailed analysis of demand and implementation alternatives
- Analyze residential sector
- Further engagement with utility companies
- Explore cooperation options between public and private sector
Thank you!

Questions?
### Specifications

<table>
<thead>
<tr>
<th></th>
<th>Site A</th>
<th>Site B</th>
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</thead>
<tbody>
<tr>
<td>Estimated Capacity [MW]</td>
<td>51.8</td>
<td>13.3</td>
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<tr>
<td>Network length [m]</td>
<td>9942</td>
<td>1206</td>
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<td>Chiller capacity [MW]</td>
<td>24.1</td>
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<td>Storage capacity [MWh]</td>
<td>267</td>
<td>71</td>
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<td>Storage size [m3]</td>
<td>28,700</td>
<td>7,600</td>
</tr>
</tbody>
</table>
Thank you!

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