



666 Fifth Avenue
New York, NY 10103
phone (212) 399-3600
fax (212) 399-3643

www.tishmantechologies.com

The Top Ten Best Countries in the World for Locating Data Centers

*Report prepared by: Ronald H. Bowman, Jr.
Executive Vice President
Tishman Technologies Corporation
Author of *The Green Guide to Power: Thinking Outside the Grid*,
and *Business Continuity Planning: A Strategic Implementation Guide*
Email: [bowmanr@tishman.com](mailto:b Bowmanr@tishman.com)*

Perhaps the most critical factor in the decision-making process regarding a new data center for a company or organization requiring 24/7, mission-critical, global operations is the location of the facility. In developing a list of the Top 10 Countries, and the Cities within them, in which to build a data center, I have analyzed a multitude of factors that led me to these conclusions. There is an overwhelming shift in the business world today to build data centers in the most economically efficient locations in the world because the means and technology to do so exist now more than ever before, and the economic pressures to keep operating costs contained are formidable.

The amount and reliability of outside plant (OSP) infrastructure (power, water, and fiber) to support Mission Critical Facilities remains the main geographic determinant, however, specific user-generated drivers will vary somewhat for each individual owner.

Data centers are costly to build and operate so it's imperative to right-size them and place them in the more economically attractive and reliable locations, from an operations point of view. I believe I have captured the most critical drivers, which represent the stakeholder's needs as well as the most relevant technology changes and opportunities that relate to the facilities' TCO (Total Cost of Ownership).

Today's adverse economic climate has provided stake holders with a sense of urgency in executing opportunities for remote, diverse, and asynchronous data center solutions. The financial restrictions on super-sized spending to build new or maintain legacy data centers has forced the IT "generals?" to retreat from tactical best practices to "outside the box" strategic planning and implementation. Thankfully, we are coming out of a negative economic climate dominated by reactive, tactical, solution-driven decisions and getting back into a "strategic planning" environment that emphasizes long-term data center topology.

Current Strategic Thinking

It is no longer cost effective for data centers to serve as warehouses for non-mission critical “just-in-time” solutions. Critical applications with synchronous relevance (just outside the cities) to urban centers will be part of a topology along with redundant asynchronous, non-critical applications in rural regions. Data centers will no longer be an IT dumping ground for any old application.

The proprietary scoring and weighing associated with the following list include, but are not limited to, the blended, weighed, and scored criteria of:

- 1. Access to reliable and scalable power inclusive of the generating cost of CO2 emissions.**
- 2. Access to cooling solutions, including potable and grey water with free cooling options.**
- 3. Confluence of last-mile, long-haul, and submersible cable connectivity. Scalable and burstable optics of Central Offices (CO's) and Network Access Points.**
- 4. Relevant government, as well as civilian stability and security.**
- 5. Possible composite Acts of God risks: disasters, duration, and consequences.**
- 6. Total Cost of Ownership (TCO) inclusive of VAT, sales, personal property, tariffs, one-time improvements, operating expenses, and escalation of same.**
- 7. Access and reliability to human resources (and vendors) for multi-cultural and multi-lingual operations and sustainability (closeness to critical mass of IT and people).**
- 8. Existing and potential eco-friendly and renewable energy conservation and energy creation to enhance assets.**

The Countries/Cities that I have ranked as most attractive, and the reasons, are as follows:

1. Iceland--Reykjavík: Low-energy cost, free cooling
2. United States: Low-energy cost, favorable labor, and fiber optics
 - i. North Carolina
 - ii. Tennessee
3. China/Vietnam: Extraordinary demand and new/diverse fiber optic routes in place
 - i. Shanghai perimeter
 - ii. Ho Chi Minh City
 - iii. Hong Kong
 - iv. Shantou (submersible, fiber-optic landing point)
 - v. Beijing
4. Latvia: Low-cost hydro power, favorable labor
5. India: Extraordinary demand, favorable labor
 - i. Mumbai
 - ii. Bangalore
 - iii. Jakarta
6. Russia: Favorable telecom, free cooling, favorable labor

- i. St. Petersburg perimeter
 - ii. Moscow
- 7. Canada: Favorable labor, free cooling, favorable telecom
 - i. Vancouver
 - ii. Toronto
- 8. Japan: Extraordinary demand, favorable telecom
 - i. Tokyo
 - ii. Kobe
- 9. New Zealand: Strategic location, green power, favorable labor
- 10. United Arab Emirates: Strategic location, favorable labor, telecom
 - i. Dubai
 - ii. Abu Dhabi

This weighed and scored study anticipated the use of commercially deployed IT and optics technology, not as beta systems, but rather as true value-added enhancements. Virtualization, cloud computing, and regular/remote batch work allows for remote data processing to be performed in remote parts of the world.

The list scores countries on their current and near-future availability of data center space, power, telecom reliability, and cooling, along with associated costs. The decommissioning of fossil fuel plants, construction of fossil fuel plants, availability of renewable power sources, and nuclear energy creation are weighed and scored.

Access to geothermal energy benefits of free or ambient air, as well as access to reliable and sometimes free and cool water aquifers, weighted in the matrix.

The access to a deep, talented human talent pool did not weigh highly on the study. We are collectively doing more with fewer humans, which enhances the remote data center model. Some countries have very dense urban environments but also rural regions that will make more sense from a TCO point of view.

There will always be discussion about some cities in countries that are not mentioned, which are compelling, and some countries with cities on the list that make no sense. I wish to emphasize that this is a list of guidelines for data center siting globally. The drivers for the “Top Ten Countries” are the compelling and obvious ones: sources of power, cooling, telecom, labor, and favorable Acts of God. These countries will provide a favorable TCO model for Data Center Users and Data Center Developers.