New Transmission – Cost Causation & Beneficiary Analysis

Panel Discussion:
Federal and International Examples

PRESENTED TO
Midwest Governors Association &
Organization of MISO States

PRESENTED BY
T. Bruce Tsuchida

November 5, 2019

THE Brattle GROUP

Disclaimer

This presentation is prepared for the Midwest Governors Association & Organization of MISO States for discussion purposes. It is not meant or permitted to be a substitute for the exercise of the audiences' own business judgment. The analyses and report may have involved the use of assumptions and projections with respect to conditions that may exist or events that may occur in the future. Although the authors have applied assumptions and projections that are believed to be reasonable, they are subjective and may differ from those that might be used by other economic or industry experts to perform similar analysis. In addition, and equally as important, actual future outcomes are dependent upon future events that are outside the authors' control. No one can give any assurance that the assumptions, projections, or judgments used will prove to be correct or that actual future outcomes will match the forecasts. The Brattle Group cannot, and does not, accept liability under any theory for losses suffered, whether direct or consequential, arising from any reliance on this presentation, and cannot be held responsible if any conclusions drawn from this presentation should prove to be inaccurate. Finally, the views expressed are of the authors and do not necessarily represent those of the Brattle Group.

Agenda

U.S. Practice

- Various FERC Orders
- Cost Allocation Principles
- Observations

Europe Practice

- The European System
- Ten-Year Network Development Plan
- Transmission Tariffs Varies by Country
- Energy and Capacity Charges
- G-Charges and L-Charges
- Generator Interconnection

U.S. Practice

Various FERC Orders

FERC Order 2003

- Transmission tariff to include standardized Large Generation Interconnection Procedure.
  - Direct connection facilities and network transmission upgrades.

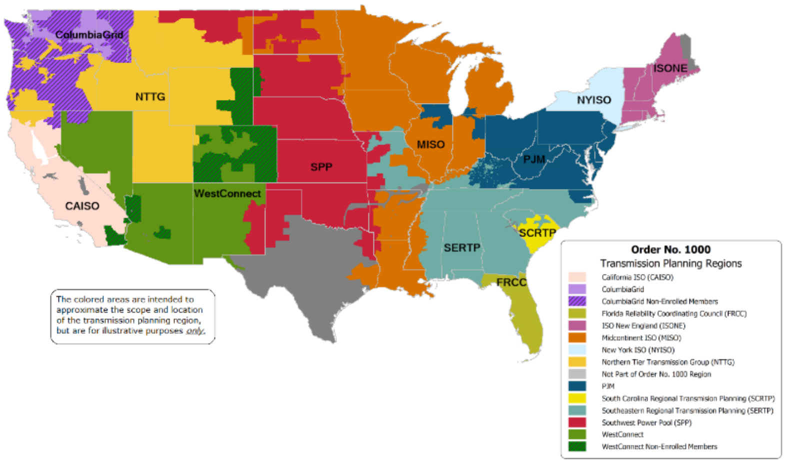
FERC Order 890

- Nine planning principles including cost allocation (e.g., regional projects that do not fall under existing rate structures).
  - Cost allocation should be reasonably proportionate to measurable economic or reliability benefits.

FERC Order 1000

- Requires public utility transmission providers to participate in a regional transmission planning process (to satisfy Order 890 requirements).
- Provides six generalized cost allocation principles. (See next slide.)

15 Transmission Planning Areas

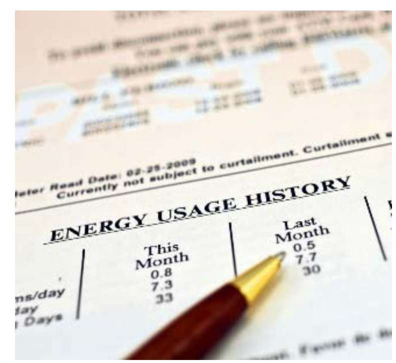


Source: https://www.ferc.gov/industries/electric/indus-act/trans-plan/trans-plan-map.pdf

Six Cost Allocation Principles

Six Cost Allocation Principles from FERC Order 1000

1. Allocation should be roughly commensurate with estimated benefits.
2. Those that receive no benefits should not be involuntarily allocated any costs.
3. If a benefit to cost ratio threshold is to be used for evaluation, the threshold should not be too high.
4. Cost allocation should be done solely within the transmission planning region.
5. The cost allocation method and data used to determine benefits/beneficiaries should be transparent and adequately documented.
6. Transmission planning regions can apply different cost allocation methods for different types of projects in the regional transmission plan (e.g., reliability vs market efficiency vs public policy projects).
   - These principles were provided for both regional and interregional cost allocation methods.



Cost Allocation Methods Observed

Cost Allocation Methods Observed in the U.S. and Canada

- In general, there are three basic approaches for cost recovery of transmission projects:
  - Regulated cost recovery: the vast majority.
  - Merchant: costs are recovered through market participants (e.g., subscriptions).
  - Voluntary or participant-funded: very rare case where project sponsors (including individual regulated utilities) agree to cost-sharing outside of existing regulatory process.
- Beneficiary pays.
- Most of the regulated cost is allocated to load.
  - Vertically integrated utilities might allocate all to load.
  - Allocation among load is oftentimes driven by load share (various approaches exists).
- Regional vs local allocation by threshold.
  - MISO Multi-Value Projects.
  - PJM Multi-Driver Projects or EHV projects.
  - SPP Highway (vs Byway).
  - ISO-NE Regional Benefit Upgrades.

The European Union System

Unified Transmission Planning through the Ten Year Network Development Plans (TYNDP).

1. Non-binding, biannual community/regional plans

2. Binding, annual national plans

3. Nominations for projects to receive PCI status from EU

4. Approved PCI projects get fast-tracked

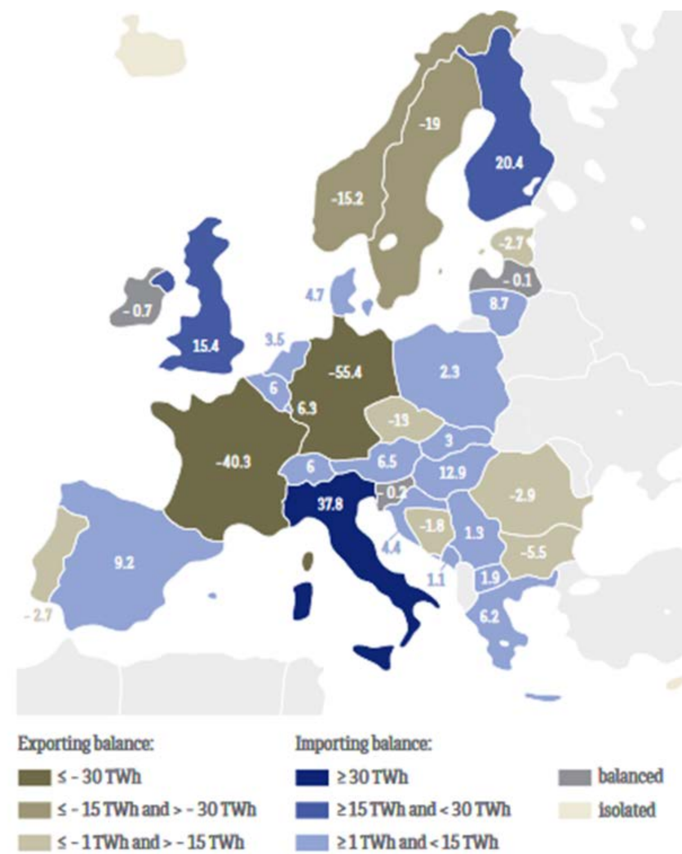
1. Non-binding plans developed at the ENTSO-E "community" level and at the regional level every 2 years.

2. Binding plans developed annually by each country.
    - Developed by transmission system operators and approved by regulator.
    - Considers work done in the community/regional plans.

3. Nominates "Projects of Common Interest" (mostly cross-border projects), which are kicked back up to the Union for broader support.

4. Projects of Common Interest get special treatment at the EU level.
    - Streamlined permitting process and access to EU-level funds and financial instruments.

2017 Energy Balance



Source: https://docstore.entsoe.eu/Documents/Publications/Statistics/electricity_in_europe/entso-e_electricity_in_europe_2017_web.pdf

Ten Year Network Development Plan

Year	Time Horizon	Scenarios	Market Studies	Network Studies	Project Evaluation
2010	2020	2 (bottom-up scenarios)	None	Grid planning principles presentation	First sketch of economic analysis and criteria for prioritization
2012	2020 2030	4 (top down scenarios)	Pan-European (1 node per price zone)	Common model (pan-European Power Systems Model) used. Performed	Valued against multi-criteria scale developed by ENTSO-E (grid transfer capability increase, plus social welfare, RE integration, supply security)
2014	2030	4 (2 top-down, 2 bottom-up)	Pan-European and regional		CBA aimed for system-wide cost benefit analysis
2016	2020 2030	4 for 2030 (focus on EU decarb goals), 1 for 2020 (expected progress)		Performed and integrated with CBA	CBA formalized and includes input from project developers
2018	2020 2025 2030 2040	Scenarios built jointly with gas. 3 each for 2030 and 2040 (with 2050 target). 1 each for 2020 and 2025.			Aims at presenting all projects with sufficient level of maturity and demonstrable positive impact, or represent high potential solutions

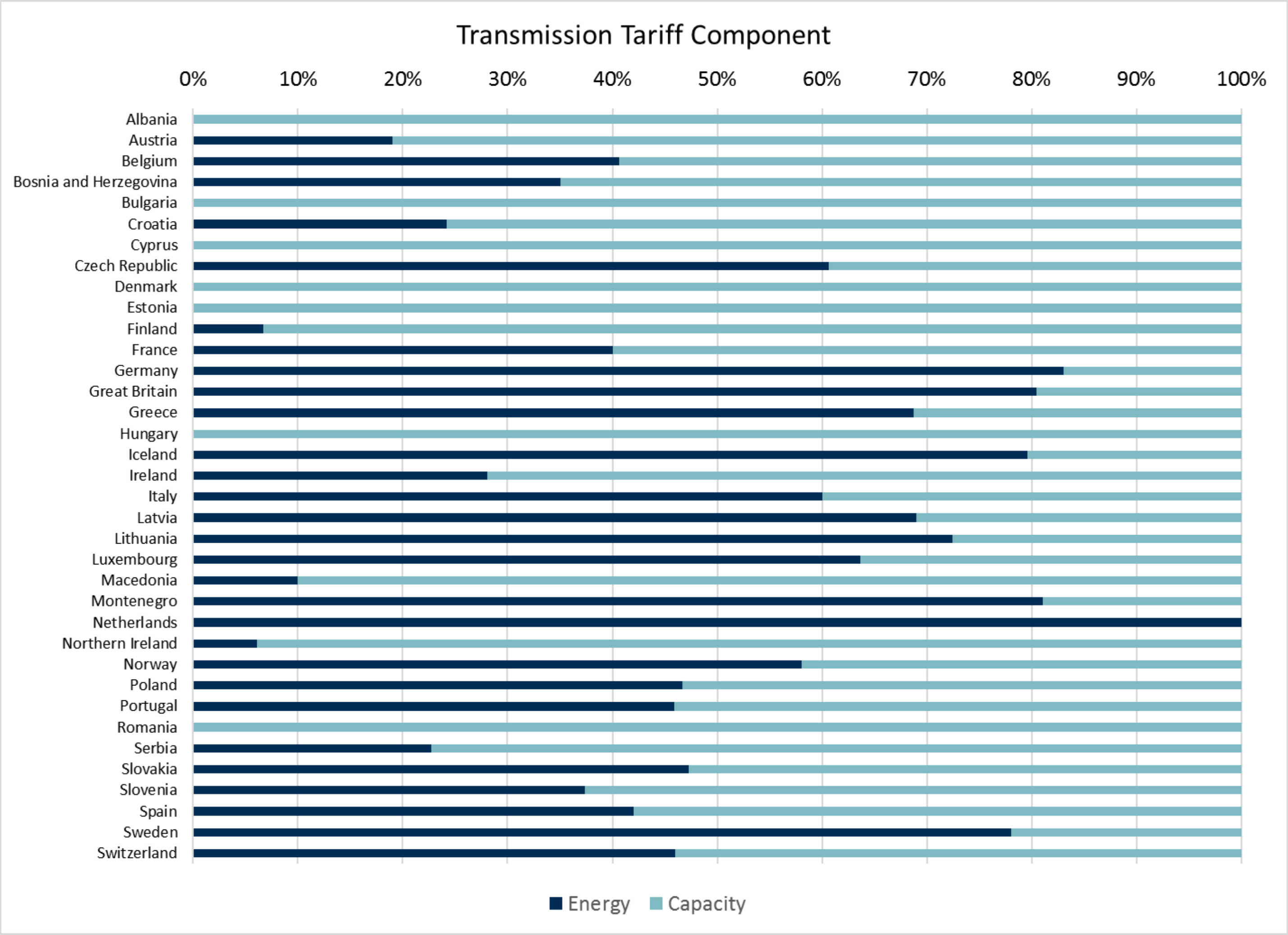
For Discussion Purposes

Transmission Tariffs Vary by Country

Various systems of electricity transmission pricing and associated tariff structures.

- Transmission access is generally charged via capacity component and/or energy (volumetric) component. (See slides 10 and 11)
- Transmission tariffs can be applied to either electricity generators (G-charges) or consumers (L-charges). (See slides 11 and 12)
- Some countries (e.g., Great Britain, Ireland, Norway, Sweden, Romania) include locational elements while most EU countries do not.
  - In Sweden, G-charges decrease linearly with latitude (from north to south) while L-charges increase with latitude (from south to north).
- Different cost concepts (across European countries) shape each country's tariff.
  - Most European countries tariff structures are based on the average cost of the respective TSO (e.g. Germany and Austria), with the primary objective of recovering the total costs the transmission system in a transparent and predictable manner.
  - Great Britain applies a concept of long run incremental cost in structuring the locational relativities of generation and load tariffs.
  - Norway has a 'point of connection' tariff system that charges users on a nodal basis reflecting the costs imposed by injections/withdrawals (including losses)—therefore, incorporating the concept of short run marginal cost.

Transmission Tariff Component



Source: Brattle analysis of ENTSO-E Overview of Transmission Tariffs in Europe: Synthesis 2018, available at https://docstore.entsoe.eu/Documents/MC%20documents/TTO_Synthesis_2018.pdf

G-Charges and L-Charges

G-Charges Share of Network Charges by Country

0%
- Albania
- Bosnia and Herzegovina
- Bulgaria
- Croatia
- Cyprus
- Czech Republic
- Estonia
- Germany
- Greece
- Hungary
- Iceland
- ***Italy***
- Latvia
- Lithuania
- Luxembourg
- Macedonia
- Netherlands
- Poland
- Serbia
- Slovenia
- Switzerland

<5%
- Denmark (3.1%)
- France (3.0%)
- Romania (2.6%)
- ***Slovakia*** (2.6%)

<10%
- Belgium (6.0%)
- Portugal (7.9%)

<20%
- Austria (14.0%)
- Finland (19.0%)
- ***Great Britain*** (14.8%)
- Spain (10.0%)

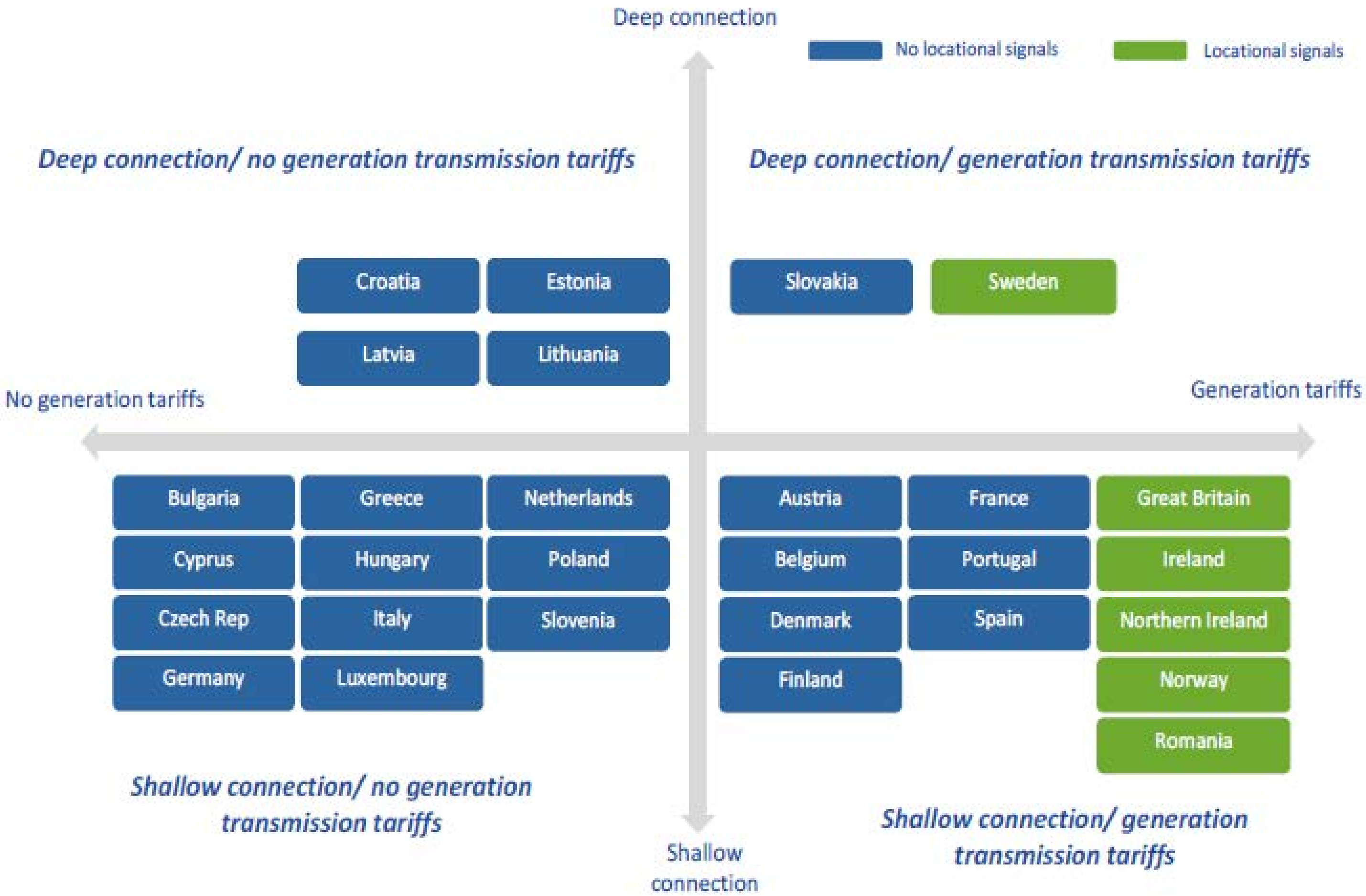
>20%
- ***Ireland*** (25.0%)
- Montenegro (35.2%)
- ***Northern Ireland*** (25.0%)
- Norway (31.0%)
- ***Sweden*** (38.0%)

Legend
- Countries that charge losses separately
- Countries that charge for ancillary services separately
- ***Countries where charges are capacity based rather than energy based***

General Observations:
- System losses and ancillary services are largely included in the tariffs.
- Nordic countries tend to have higher shares while the center and eastern countries show lower (or zero) charges from generators.

Source: Brattle analysis of ENTSO-E Overview of Transmission Tariffs in Europe: Synthesis 2018, available at https://docstore.entsoe.eu/Documents/MC%20documents/TTO_Synthesis_2018.pdf

Generation Interconnection



Source: Scoping Towards Potential Harmonisation of Electricity Transmission Tariff Structure, Agency for Cooperation of Energy Regulators (ACER), August 2015, available at http://www.acer.europa.eu/en/electricity/fg_and_network_codes/documents/cepa%20acer%20_%20tx%20charging_final%20report.pdf

Comparison & Observation

FERC Order 1000 provides six cost allocation principles.

- Many of the approaches developed in the U.S. and Canada show similarity.
- The European countries have developed varying approaches that may appear quite different from those implemented in the U.S. and Canada.
- The European approaches largely appear to comply with the six allocation principles outlined in FERC Order 1000.

2018 TYNDP Boundaries

Source: TYNDP 2018 Executuve Summary, with Brattle annotation. TYNDP 2018 Executive Summary available at: https://tyndp.entsoe.eu/Documents/TYNDP%20documents/TYNDP2018/consultation/Main%20Report/TYNDP2018_Executive%20Report.pdf

For Discussion Purposes

Presented By

T. Bruce Tsuchida
Principal, Boston

+1.617.234.5686
Bruce.Tsuchida@brattle.com

Mr. T. Bruce Tsuchida is a Principal of The Brattle Group with over twenty five years of experience in domestic and international utility operation, power market analysis, and asset evaluation.

He specializes in assessing the impact of new technologies and regulatory changes, including analysis of evolving wholesale electric markets and modeling, impact of renewable and other new technologies' on system operations, utility business, and various impacts on valuations of transmission and generation assets, deliverability, and contracts. Regulatory proceeding related analyses include cost benefit analyses, such as those for evaluating new technologies and the resource portfolio, and various cost of service studies.

Prior to joining Brattle, Mr. Tsuchida was a Principal at Charles River Associates, and previously a Project Manager at the Tokyo Electric Power Company (TEPCO) where he oversaw international generation development projects and was the lead engineer for Southeast Asia generation units.

Mr. Tsuchida earned his M.S. in Technology and Policy, and M.S. in Electrical Engineering and Computer Science from the Massachusetts Institute of Technology in Cambridge, Massachusetts, and a B.S. in Mechanical Engineering from Waseda University in Tokyo, Japan.

About Brattle

The Brattle Group provides consulting and expert testimony in economics, finance, and regulation to corporations, law firms, and governments around the world. We aim for the highest level of client service and quality in our industry.

OUR SERVICES

Research and Consulting

Litigation Support

Expert Testimony

OUR PEOPLE

Renowned Experts

Global Teams

Intellectual Rigor

OUR INSIGHTS

Thoughtful Analysis

Exceptional Quality

Clear Communication

For Discussion Purposes

Our Practices and Industries

ENERGY & UTILITIES

- Competition & Market Manipulation
- Distributed Energy Resources
- Electric Transmission
- Electricity Market Modeling & Resource Planning
- Electrification & Growth Opportunities
- Energy Litigation
- Energy Storage
- Environmental Policy, Planning and Compliance
- Finance and Ratemaking
- Gas/Electric Coordination
- Market Design
- Natural Gas & Petroleum
- Nuclear
- Renewable & Alternative Energy

LITIGATION

- Accounting
- Analysis of Market Manipulation
- Antitrust/Competition
- Bankruptcy & Restructuring
- Big Data & Document Analytics
- Commercial Damages
- Environmental Litigation & Regulation
- Intellectual Property
- International Arbitration
- International Trade
- Labor & Employment
- Mergers & Acquisitions Litigation
- Product Liability
- Securities & Finance
- Tax Controversy & Transfer Pricing
- Valuation
- White Collar Investigations & Litigation

INDUSTRIES

- Electric Power
- Financial Institutions
- Infrastructure
- Natural Gas & Petroleum
- Pharmaceuticals & Medical Devices
- Telecommunications, Internet, and Media
- Transportation
- Water

Our Offices


BOSTON


BRUSSELS


CHICAGO


LONDON


MADRID


NEW YORK


ROME


SAN FRANCISCO


SYDNEY


TORONTO


WASHINGTON